Draft Preliminary Drainage Report

Florida Department of Transportation

District Four

SR 9/I-95

Limits of Project: FROM SOUTH OF SR 870/COMMERCIAL BOULEVARD TO NORTH OF CYPRESS CREEK ROAD

Broward County, Florida

Financial Management Number: 435808-1-22-02

ETDM Number: 14222

July 31, 2018

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 14, 2016 and executed by FHWA and FDOT.

This action has been determined to be a Draft Preliminary Engineering Report (PER) which meets the definition contained in 40 CFR 1508.4, and, based on past experience with similar actions and this analysis, does not involve significant environmental impacts. Signature below constitutes Location and Design Concept Acceptance:

Director of the Office of Environmental Management
Florida Department of Transportation

Date

NOTES TO REVIEWER

1. This report is based on the best available information at this time.
2. This is a 60% Draft Preliminary Drainage Report which focuses on establishing existing conditions, and determining stormwater management facilities needed to satisfy Water Quality and Quantity requirements set forth by relevant government agencies.
3. Items that are pending are highlighted in yellow.

EXECUTIVE SUMMARY

This report provides the drainage documentation required to support the Project Development and Environment (PD&E) Study prepared for SR-9/I-95 From South of SR-870/Commercial Boulevard to North of Cypress Creek Road.

The project is located within the limits of the City of Fort Lauderdale, Oakland Park and Pompano Beach. The South Florida Rail Corridor (SFRC)/CSX Railroad is adjacent to and runs parallel along the west side of I-95 within the project area. The signalized intersections on Commercial Boulevard immediately adjacent to I-95 are Powerline Road to the west and N. Andrews Avenue to the east. The signalized intersections on Cypress Creek Road immediately adjacent to I-95 are N. Andrews Avenue to the west and NE 7 Avenue to the east.

The primary need for this project is to increase capacity on I-95 and at the Cypress Creek Road/I-95 and Commercial Boulevard/I-95 interchanges. The project is also intended to improve safety within the vicinity, including access to I-95 and the arterial intersections.

The project area was divided into four main drainage systems (i.e. System C13-SCOM, C13-NCOM, C14-SCYP and C14-NCYP), as shown in **Figure 5-1**. The naming convention was chosen so that the first three characters represent the name of the receiving waterbody, followed by the fourth character which represents the location of the system with respect to the intersecting roadway at the interchange (i.e. Commercial Boulevard. & Cypress Creek Road), and then by the last three characters which represent the name of the intersecting roadway at the interchange. Runoff from Systems C13-SCOM and C13-NCOM ultimately discharges into the C-13 Canal while runoff from Systems C14-SCYP and C14-NCYP discharges into the C-14 Canal.

The approach to meet water quality requirements for Systems C13-SCOM and C13-NCOM is to account for the existing surplus capacity (2.43 ac-ft.) that is available in the interconnected treatment areas (swales and ponds) just south of these systems. Runoff from Systems C13-SCOM and C13-NCOM will enter these treatment areas before discharging into the C13-Canal.

The approach to meet water quality requirements for System C14-SCYP, for the preferred alternative, is to account for the surplus capacity that is available in System C14-NCYP. In addition, the control structures for various interconnected dry detention ponds in System C14-NCYP will be raised 2 inches. These ponds include Pond 5, Pond 6, Pond 7, Pond 8, Swale 9, Swale 10, and Swale 14. Using this approach, 6.23 ac-ft. of treatment volume will be provided and will be sufficient to accommodate the proposed roadway improvements for System C14-SCYP. The approach to meet water quality requirements for System C14-NCYP is to treat the additional runoff using the existing treatment areas with surplus capacity. Based on information obtained from SFWMD Permit 06-01465-S, it was determined that the existing treatments areas in System C14-NCYP have a surplus capacity of 3.60 ac-ft. which is sufficient to accommodate the proposed roadway improvements, under the preferred alternative.

Stormwater management systems proposed by this study meet current water quality standards as set forth in Chapter 62-302 of the Florida Administrative Code. The approach to meet water quality requirements is to provide treatment for the increase in impervious area and restore or replace existing treatment facilities impacted by this project. The recommended permitting approach is to modify existing SFWMD Permit 06-01465-S. Following this approach, no offsite ponds or right of way acquisition is needed to meet current permitting requirements.

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1 INTRODUCTION

The Florida Department of Transportation (FDOT) District Four is conducting a Project Development and Environment (PD&E) Study for improvements to SR 9/I-95 from south of SR 870/Commercial Boulevard to north of Cypress Creek Road in Broward County, Florida (Milepost 14.5 to Milepost 17.0).

This Preliminary Drainage Report provides the drainage documentation required to support the Project Development and Environment (PD&E) Study prepared for SR 9/I-95 from South of SR-870/Commercial Boulevard Interchange to North of Cypress Creek Road. This report documents the stormwater management systems required to meet the design stormwater quality and quantity criteria. In addition, possible locations for stormwater ponds, right of way needed to accommodate the proposed stormwater management facilities and a preliminary hydraulic analysis of the study area are provided in this report. Finally, this report documents existing South Florida Water Management District Permits and provides a recommended permitting approach that can be used when this project goes to construction.

1.1 Project Background

I-95 is one of the most important surface transportation facilities along the east coast of Florida. As part of the state's Strategic Intermodal System (SIS), it is a critical asset for moving people and goods within the 12 coastal counties, including Miami-Dade, Broward, and Palm Beach Counties.

FDOT is conducting a comprehensive systematic analysis of the I-95 interchanges in Broward and Palm Beach Counties for the first time since the initial construction of the interstate in the 1970s. Per the I-95 Interchange Master Plan, FDOT has developed preliminary design concepts to address traffic spillback onto I-95, improve traffic operations at the interchanges, reduce congestion which has reached unacceptable levels during peak hours, and to enhance overall safety at each interchange, including those at Commercial Boulevard and Cypress Creek Road. These preliminary design concepts were developed in separate Interchange Concept Development Reports (ICDR) for each interchange completed in February 2016 (Commercial Boulevard) and June 2015 (Cypress Creek Road).

The intent of the I-95 PD&E Study from south of Commercial Boulevard to north of Cypress Creek Road is to study in further detail the preliminary design concepts from the I-95 Interchange Master Plan ICDRs in addition to other alternatives. This PD&E Study will also include a No-Action alternative which assumes no proposed improvement and serves as a baseline for comparison against other alternatives.

1.2 Project Description

This project is proposing improvements to the Commercial Boulevard and Cypress Creek Road interchanges and along I-95 from south of Commercial Boulevard to north of Cypress Creek Road, a distance of approximately two miles in Broward County, Florida. A project location map is depicted in **Figure 1-1**.

I-95 is the primary north-south interstate facility that links all major cities along the Atlantic Seaboard and is one of the most important transportation systems in southeast Florida. I-95 is one of the two major expressways, Florida's Turnpike being the other, that connect the major employment centers and residential areas within the South Florida tri-county area. I-95 is part of the state's SIS and the National Highway System (NHS). In addition, I-95 is designated as an evacuation route along the east coast of Florida.

I-95, within the majority of the project limits, has six general purpose lanes (three in each direction) and two High Occupancy Vehicle (HOV) lanes (one in each direction). This segment of I-95 is functionally classified as a Divided Urban Principal Arterial Interstate and has a posted speed limit of 65 miles per hour. The access management classification for this corridor is Class 1.2, Freeway in an existing urbanized area with limited access. There are two full interchanges within the project limits located at Commercial Boulevard and Cypress Creek Road, as well as entry ramps from N. Andrews Avenue and from the Cypress Creek Park and Ride Lot to I-95 southbound.

Figure 1-1 Project Location Map

The proposed improvements will be compatible with the proposed I-95 Express Lanes Phase 3 Project, which will introduce two tolled, express lanes in place of the existing HOV lanes from Broward Boulevard in Broward County to Linton Boulevard in Palm Beach County. Phase 3A, which extends from Broward Boulevard to south of SW 10 Street and includes the limits of the proposed interchange improvements, began construction in early 2016.

1.3 Purpose and Need

The primary need for this project is to increase capacity and improve traffic operations on I-95 and at the Commercial Boulevard and Cypress Creek Road interchanges. The project is also intended to improve safety within the vicinity, including access to I-95 and the arterial intersections. Secondary considerations for the purpose and need of this project include system linkage, modal interrelationships, transportation demand, social demands and economic development, and evacuation.

I-95 within the project limits currently operates at Level of Service (LOS) F. Additionally, Commercial Boulevard operates at LOS E east of I-95 and LOS F west of I-95, while Cypress Creek Road operates at LOS E on both sides of I-95. Without improvements, the driving conditions will continue to deteriorate well below acceptable LOS standards. The 95 Express Phase 3 improvements will help maintain or slightly improve the I-95 corridor LOS by adding one travel lane in each direction in the form of an Express Lane. The improvements proposed as part of this project will complement the I-95 Express Lanes improvements.

The existing Cypress Creek Park and Ride southbound on ramp and Commercial Boulevard southbound on ramp provide less than 500 feet of weave distance before the acceleration lane drops and merges with the general-purpose traffic. This forces commuters to merge with the general-purpose traffic while accelerating which is an unsafe maneuver.

The proposed modifications will improve the safety of the project corridor. The buses travelling onto I-95 from the Cypress Creek Park and Ride will be provided greater distance prior to merging with I-95 southbound traffic. Additionally, the existing substandard vertical clearance of the North Andrews Avenue bridge over I-95 will be resolved with the bridge replacement.

The project is anticipated to improve emergency evacuation capabilities by enhancing connectivity and accessibility to major arterials designated on the state evacuation route. I-95, Commercial Boulevard, and Cypress Creek Road serve as part of the emergency evacuation route network designated by the Florida Division of Emergency Management and by Broward County. Commercial Boulevard and Cypress Creek Road move traffic from the east to I-95. I-95 is critical in facilitating traffic during emergency evacuation periods as it connects to other major arterials and highways of the state evacuation route network (i.e., I-595 and the Florida's Turnpike).

The Cypress Creek Road Interchange Project is included in the Broward Metropolitan Planning Organization (MPO) Transportation Improvement Program (TIP) for Fiscal Years (FY) 2016-2020, FDOT Work Program FY 2017- 2021, FDOT State TIP FY 2016-2020, and FDOT SIS Five Year Plan FY 2016-2020 for PD&E Phase in FY 2016.

The Broward MPO 2035 Long Range Transportation Plan (LRTP) included improvements to all I-95 interchanges in Broward County under Illustrative Roadway Projects. Illustrative projects are those that cannot be included in the cost feasible plan due to financial constraints but would be included in a future approved TIP.

2 Alternatives Considered

The alternative development includes a southbound Collector-Distributor (CD) road system between the two interchanges, four Alternatives for the Commercial Boulevard interchange area and two Alternatives for the Cypress Creek Road interchange area.

2.1 Commercial Boulevard Alternatives

2.1.1 ALTERNATIVE 1 – AT-GRADE IMPROVEMENTS

I-95 Northbound Off-Ramp:

- Provide two additional eastbound right turn lanes to have a triple right turn movement going to Commercial Boulevard east.

I-95 Southbound Off-Ramp:

- Provide one additional westbound right turn lane to have a dual right turn movement going to Commercial Boulevard west.

Commercial Boulevard and Powerline Road Intersection:

- Provide one additional Powerline Road southbound left turn lane by removing one of the three through lanes to have triple lefts going east on commercial Boulevard.
- Provide one additional Commercial Boulevard westbound right turn lane to have a dual right turns movement going to Powerline Road northbound.
- Provide one additional Commercial Boulevard westbound through lane by removing one of the two westbound to southbound left turn lanes to have four through westbound lanes.

Commercial Boulevard and N. Andrews Avenue Intersection:

- Provide one additional N. Andrews Avenue southbound left turn lane to have dual lefts going east on Commercial Boulevard.
- Provide one additional Commercial Boulevard eastbound through lane to have four through eastbound lanes.

2.1.2 ALTERNATIVE 2 – ECHELON AND BRIDGE OVER N. ANDREWS AVENUE

I-95 Northbound Off-Ramp:

- Provide two additional eastbound right turn lanes to have a triple right turn movement going to Commercial Boulevard east.

I-95 Southbound Off-Ramp:

- Provide one additional westbound right turn lane to have a dual right turn movement going to Commercial Boulevard west.

Commercial Boulevard and Powerline Road Intersection:

- Provide a T-shape (echelon) bridge at the intersection to accommodate Powerline northbound and southbound through traffic, northbound to westbound left traffic southbound to eastbound left traffic, and southbound to westbound right traffic. This T-shape bridge has three lanes along Powerline Road and one lane along Commercial Boulevard. In addition, one lane frontage roads will be provided on each side of the elevated section along Powerline Road. All through lanes along Commercial Boulevard remain at-grade. Note that the eastbound and westbound existing dual left turn lanes have been reduced to just one left turn in each direction.
- Provide a U-turn bay to allow dual U-Turn lanes along Commercial Boulevard close to NW 12 Avenue to accommodate the Powerline Road southbound to eastbound left traffic coming from the T-shape bridge.

- Provide an additional through lane along the segment of Commercial Boulevard from northbound off-ramp terminal to NE 3 Avenue.

Commercial Boulevard and N. Andrews Avenue Intersection:

- Provide one additional N. Andrews Avenue southbound left turn lane to have dual lefts going east on Commercial Boulevard.
- Provide one additional Commercial Boulevard eastbound through lane to have four through eastbound lanes.
- Reduce existing westbound though lanes from three to two lanes.
- Provide a one lane bridge across N. Andrews Avenue to accommodate Commercial Boulevard westbound traffic to the existing I-95 westbound to southbound flyover on-ramp. The proposed one lane bridge merges with the existing I-95 westbound to southbound at-grade ramp which accommodates the N. Andrews Avenue southbound and northbound traffic heading to southbound I-95. This reconfigured I-95 westbound to southbound flyover on-ramp will have two lanes at the entrance and will drop to one lane after the third span of the flyover bridge. The first three spans of the flyover bridge will be reconstructed.
- Convert existing two-lane frontage road located at the northeast quadrant of the intersection to a one lane frontage road in the westbound direction. The west end of the proposed one lane frontage road turns northward before approaching N. Andrews Avenue and terminates at the intersection of NE 1 Avenue and NE 51Street.

2.1.3 ALTERNATIVE 3 – GRADE SEPARATION & PARTIAL FLYOVER WIDENING

I-95 Northbound Off-Ramp:

- Provide two additional eastbound right turn lanes to have a triple right turn movement going to Commercial Boulevard east.

I-95 Southbound Off-Ramp:

- Provide one additional westbound right turn lane to have a dual right turn movement going to Commercial Boulevard west.

Commercial Boulevard and Powerline Road Intersection:

- Provide a two lane (one way in each direction) bridge along Powerline Road to accommodate the Powerline Road northbound and southbound through traffic. A Texas U-turn is provided at both north and south approaches to facilitate local circulation.
- The at-grade configuration in the north leg of the intersection has three northbound through lanes, two southbound to eastbound left turn lanes and one southbound to westbound right turn lane. The at-grade lane configuration in the south leg of the intersection has one southbound through lane, one northbound through lane, one northbound to westbound left turn lane and one northbound to eastbound right turn lane. The east and west approaches have at-grade lane configurations similar to existing conditions except for the conversion of one of the two westbound to southbound left turn lanes into a fourth westbound through lane.

Commercial Boulevard and N. Andrews Avenue Intersection:

- Provide one additional N. Andrews Avenue southbound left turn lane to have dual lefts going east on Commercial Boulevard.

- Provide one additional Commercial Boulevard eastbound and westbound through lane to have four through lanes in each direction.
- Convert existing two-lane frontage road located at the northeast quadrant of the intersection to a one lane frontage road in the westbound direction. The west end of the proposed one lane frontage road turns northward before approaching N. Andrews Avenue and terminates at the intersection of NE 1 Avenue and NE 51Street.
- Reconfigure the existing Commercial Boulevard westbound to I-95 southbound flyover on-ramp from one to two-lanes. The reconfigured flyover on-ramp will have two lanes at the entrance and drop to one lane after the third span of the flyover bridge. The first three spans of the flyover bridge will be reconstructed.

2.1.4 ALTERNATIVE 4 – GRADE SEPARATION & BRIDGE OVER N. ANDREWS AVENUE

I-95 Northbound Off-Ramp:

- Provide two additional eastbound right turn lanes to have a triple right turn movement going to Commercial Boulevard east.

I-95 Southbound Off-Ramp:

- Provide one additional westbound right turn lane to have a dual right turn movement going to Commercial Boulevard west.

Commercial Boulevard and Powerline Road Intersection:

- Provide a two lane (one way in each direction) bridge along Powerline Road to accommodate the Powerline Road northbound and southbound through traffic. A Texas U-turn is provided at both north and south approaches to facilitate local circulation.
- The at-grade configuration in the north leg of the intersection has three northbound through lanes, two southbound to eastbound left turn lanes and one southbound to westbound right turn lane. The at-grade lane configuration in the south leg of the intersection has one southbound through lane, one northbound through lane, one northbound to westbound left turn lane and one northbound to eastbound right turn lane. The east and west approaches have at-grade lane configurations similar to existing conditions except for the conversion of one of the two westbound to southbound left turn lanes into a fourth westbound through lane.

Commercial Boulevard and N. Andrews Avenue Intersection:

- Provide one additional N. Andrews Avenue southbound left turn lane to have dual lefts going east on Commercial Boulevard.
- Provide one additional Commercial Boulevard eastbound through lane to have four through eastbound lanes.
- Reduce existing westbound though lanes from three to two lanes.
- Provide a one lane bridge across N. Andrews Avenue to accommodate Commercial Boulevard westbound traffic to the existing I-95 westbound to southbound flyover on-ramp. The proposed one lane bridge merges with the existing I-95 westbound to southbound at-grade ramp which accommodates the N. Andrews Avenue southbound and northbound traffic heading to southbound I-95. This reconfigured I-95 westbound to southbound flyover on-ramp will have two lanes at the entrance and will drop to one lane after the third span of the flyover bridge. The first three spans of the flyover bridge will be reconstructed.

- Convert existing two-lane frontage road located at the northeast quadrant of the intersection to a one lane frontage road in the westbound direction. The west end of the proposed one lane frontage road turns northward before approaching N. Andrews Avenue and terminates at the intersection of NE 1 Avenue and NE 51Street.

2.2 Cypress Creek Road Alternatives

2.2.1 ALTERNATIVE 1 – RECONSTRUCTION OF LOOPS & NEW I-95 ON-RAMP

I-95 Northbound Off-Ramps:

- Replace the existing I-95 northbound to westbound off-ramp loop at the northwest quadrant of the interchange with a two lane bridge parallel to the existing I-95 mainline northbound bridge over Cypress Creek Road. The two lane bridge accommodates the I-95 northbound to Cypress Creek westbound traffic to a stop condition at Cypress Creek Road. This movement will require signalization.
- Widen the northbound to eastbound off-ramp with an additional eastbound right turn lane to have a dual right turn movement going to Cypress Creek Road eastbound. This movement will require signalization.

I-95 Northbound On-Ramp:

- Remove the Cypress Creek Road westbound free flow right on-ramp onto I-95 northbound. Provide one additional Cypress Creek Road westbound right turn lane to have a dual I-95 on-ramp which will drop to one lane before merging with the I-95 mainline.

I-95 Southbound On-Ramps (CD Road System):

- Provide a CD road system to carry all the Cypress Creek road traffic desiring to go southbound onto I-95. The CD road system starts with a two lane bridge parallel to the existing I-95 mainline southbound bridge over Cypress Creek Road. The proposed two lane bridge accommodates the proposed reconstruction of the Cypress Creek Road westbound to southbound loop on-ramp and a new southbound on-ramp from the intersection of N. Andrews Avenue and NW 66 Street. The CD road system continues southbound parallel to the I-95 mainline and merges the southbound on-ramp from the Cypress Creek Park & Ride and then merges further south the existing I-95 southbound on-ramp from N. Andrews Avenue. The CD road system will then merge to the I-95 mainline just north of Commercial Boulevard.

N. Andrews Avenue and NE 66 Street Intersection:

- Provide an additional N. Andrews Avenue southbound left turn to have dual left turns to the new I-95 southbound on-ramp.
- Provide exclusive right turn lane from N. Andrews Avenue northbound to NE 66 Street eastbound into the new I-95 southbound on-ramp.

N. Andrews Avenue and Cypress Creek Road Intersection:

- Maintain existing lane calls at the north and south legs of the intersection.
- Remove one Cypress Creek Road eastbound through lane between NW 6 Way and N. Andrews Avenue and provide one additional right lane to have dual right turn lanes from Cypress Creek Road eastbound to N. Andrews Avenue southbound.

N. Andrews Avenue and N. Andrew Way Intersection:

- Maintain existing lane calls at all legs of intersection.

Cypress Creek Road and NE 7 Avenue Intersection:

- Provide one additional left turn lane to have dual left turn lanes from Cypress Creek Road eastbound to NE 7 Avenue northbound.

2.2.2 ALTERNATIVE 2 – NORTHBOUND TO WESTBOUND FLYOVER

I-95 Northbound Off-Ramps:

- Remove the existing I-95 northbound to westbound off-ramp loop at the northwest quadrant of the interchange.
- Widen the northbound to eastbound off-ramp with an additional eastbound right turn lane to have a dual right turn movement going to Cypress Creek Road eastbound. This movement will require signalization.
- Provide a new I-95 northbound off-ramp to Cypress Creek Road westbound traffic. The new off-ramp would depart to the east of the existing I-95 northbound off-ramp and span over Cypress Creek Road (second level) to a third level loop across the I-95 mainline and land on the west side of the north leg of the Cypress Creek Park & Ride intersection.

I-95 Northbound On-Ramp:

- Remove the Cypress Creek Road westbound free flow right on-ramp onto I-95 northbound. Provide one additional Cypress Creek Road westbound right turn lane to have a dual I-95 on-ramp which will drop to one lane before merging with the I-95 mainline.

I-95 Southbound On-Ramps (CD Road System):

- Provide a CD road system to carry all the Cypress Creek road traffic desiring to go southbound onto I-95. The CD road system starts with a two lane bridge parallel to the existing I-95 mainline southbound bridge over Cypress Creek Road. The proposed two lane bridge accommodates the proposed reconstruction of the Cypress Creek Road westbound to southbound loop on-ramp and a new southbound on-ramp from the intersection of N. Andrews Avenue and NW 66 Street. The CD road system continues southbound parallel to the I-95 mainline and merges the southbound on-ramp from the Cypress Creek Park & Ride and then merges further south the existing I-95 southbound on-ramp from N. Andrews Avenue. The CD road system will then merge to the I-95 mainline just north of Commercial Boulevard.

North Andrews Avenue and NE 66th Street Intersection:

- Provide an additional N. Andrews Avenue southbound left turn to have dual left turns to the new I-95 southbound on-ramp.
- Provide exclusive right turn lane from N. Andrews Avenue northbound to NE 66 Street eastbound into the new I-95 southbound on-ramp.

N. Andrews Avenue and Cypress Creek Road Intersection:

- Maintain existing lane calls at the north and south legs of the intersection.
- Remove one Cypress Creek Road eastbound through lane between NW 6 Way and N. Andrews Avenue and provide one additional right lane to have dual right turn lanes from Cypress Creek Road eastbound to N. Andrews Avenue southbound.

N. Andrews Avenue and N. Andrew Way Intersection:

- Maintain existing lane calls at all legs of intersection.

Cypress Creek Road and NE 7 Avenue Intersection:

- Provide one additional left turn lane to have dual left turn lanes from Cypress Creek Road eastbound to NE 7 Avenue northbound.

Note that 7-ft bike lanes are provided within the limits of all arterial streets where roadway improvements are considered except at N. Andrews Avenue at the vicinity of NW 66 Street where the existing 4-ft bike lanes are maintained. All existing sidewalks will either remain or be reconstructed to standard widths.

3 DATA COLLECTION

3.1 Vertical Datum

The vertical datum used in this report and calculations is **NAVD 88**. This datum was chosen due to the fact that most of the existing data collected in the study area is in NAVD 88. In addition, the Florida Department of Transportation (FDOT) standard datum is NAVD 88. For government agencies such as the Army Corps of Engineers (ACOE), Federal Emergency Management Agency (FEMA), and South Florida Water Management District (SFWMD), NGVD 29 is primarily used. Where practical, elevations are shown in both NGVD 29 and NAVD 88. The vertical datum shift was identified for the approximate centroid location of the study area by using the National Geodetic Survey VERTCON online tool. Coordinates of the centroid are shown below in **Table 3-1**. The datum shift used to convert NAVD 88 to NGVD 29 for this project is (+)1.585 feet. See **Appendix A** for National Geodetic Survey VERTCON datum shift.

Table 3-1: Datum Conversion from NAVD 88 to NGVD 29

Location	Latitude	Longitude	Shift (ft.)
Study Area Centroid	26° 11' 55"	80° 08' 55"	(+)1.585

3.2 Regional Watershed and Receiving Waterbodies

The study area lies within the jurisdiction of South Florida Water Management District (SFWMD), specifically within the Coral Reef and North Fork Middle River watersheds. Surface runoff south of NW 55 St ultimately discharges into the C-13 Canal and surface runoff north of NW 55 St ultimately discharges into the C-14 Canal. Refer to **Figure 3-1** for a map of the Regional watershed in the project area.

3.3 Seasonal High Groundwater Table

Geotechnical data collected from the I-95 Express Lanes Phase 3A Project (FPID: 433108-4-52-01) identified that the Average October Ground Water Level for all drainage systems in the project area ranges from 0.42 to 1.92 ft-NAVD 88 (2.00 to 3.50 ft-NGVD 29). This value was deemed to be consistent with other values used in previous permitting documentation and designs. As such, the SHGWT value of 1.92 ft-NAVD 88 (3.50 ft-NGVD 29) is considered conservative and will be used in the preliminary drainage design for this study. See **Appendix E** for the drainage report calculations that referenced the Average Groundwater table.

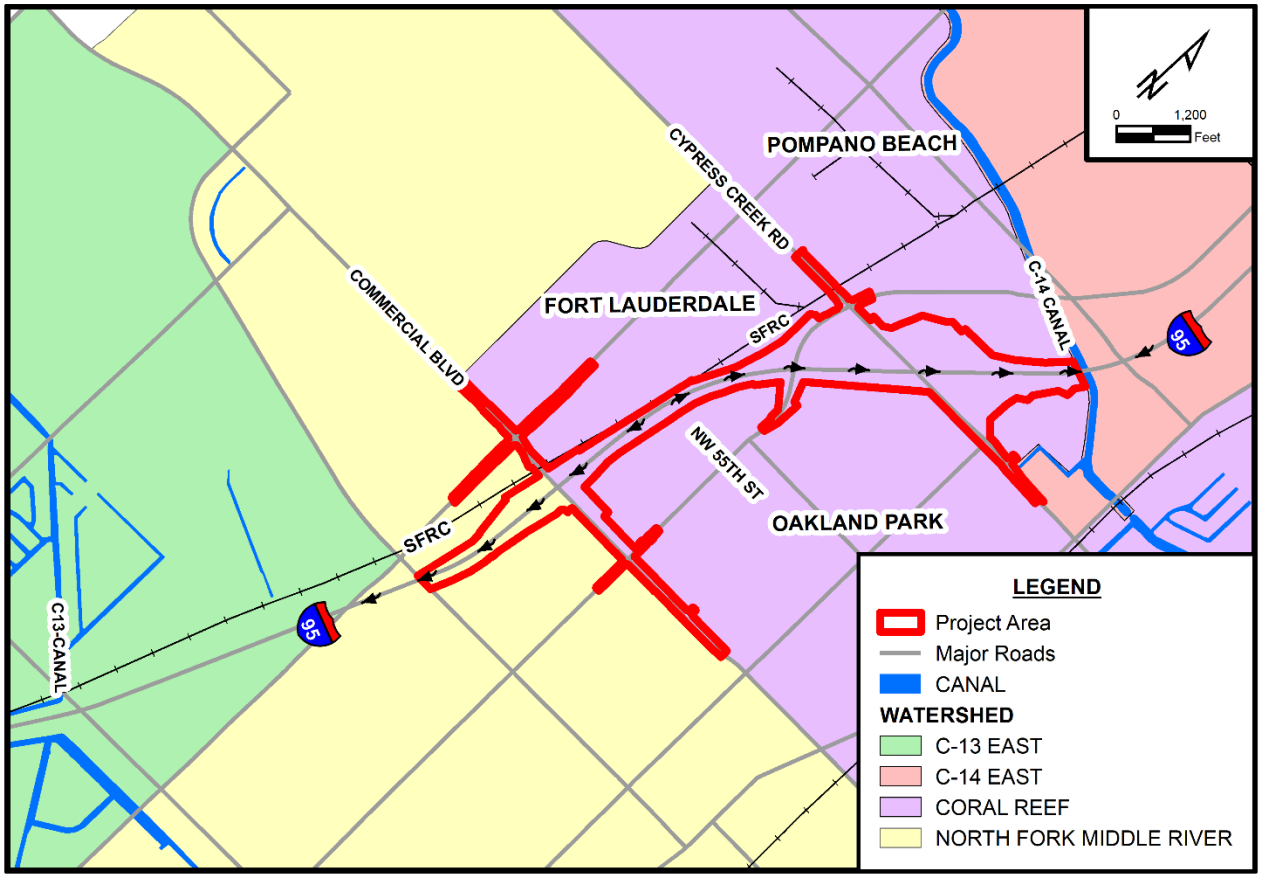


Figure 3-1: Regional Watersheds

3.4 Soil Properties

Geotechnical inventory along I-95 was performed by HR Engineering Services in 2013. Data collected from this project was used in the I-95 Express Lanes Phase 3A Project (FPID: 433108-4-52-01). A review of the documentation indicates that the hydraulic conductivity along the project corridor is moderate, 1.3 x 10^{-4} cfs/ft² – ft (See **Table 3-2**). Exfiltration trenches will not be proposed for this project. However, the conductivity values are reported here for possible future use, if needed.

Table 3-2: Percolation Rate within Project Area

Test No.	Hydraulic Conductivity (cfs / ft² – ft of head)
P-2292	1.3 x 10^{-4}

In addition to percolation testing, soil and water samples were taken to identify the soil corrosion properties (i.e. resistivity, pH level, sulfate content and chloride content) in the project area. **Table 3-3** shows that drainage culverts will be subject to a slightly aggressive environment based on the

environment criteria for substructure environmental classifications per Section 1.3.2 of the Structures Design Guidelines.

Table 3-3: Soil Corrosion Properties

Resistivity (Ω – cm)	pH	Sulfates (ppm)	Chlorides (ppm)
7200	**8.2**	**32**	**24**

Based on a desktop review of the U.S. Department of Agriculture (USDA) soil map for Broward County, six (6) general mapping units underlie the existing and potential pond sites in the study area (see **Appendix A**). Refer to **Table 3-4** for soil types within project area.

Table 3-4: Soil Types in Project Area

Map Unit Symbol	Map Unit Name	Description
10	Duette – Urban land complex	Hydrologic Soil Group A Permeability rate: 1.98 to 5.95 in/hr
15	Immokalee fine sand, 0 to 2 percent slopes	Hydrologic Soil Group B/D Permeability rate: 0.57 to 1.98 in/hr
17	Immokalee-Urban land complex	Hydrologic Soil Group B/D Permeability rate: 0.57 to 1.98 in/hr
19	Margate fine sand	Hydrologic Soil Group A Permeability rate: 1.98 to 19.98 in/hr
38	Udorthents, shaped	Hydrologic Soil Group A/D Permeability rate: 1.98 to 19.98 in/hr
40	Urban land	Fill

3.5 Wellfields

There are no wellfields within the project area. However, the study area is located approximately 0.3 miles away from the cone of influence of the City of Fort Lauderdale (Executive) Wellfield. See **Appendix A** for a wellfield map of Broward County.

4 DESIGN CRITERIA

4.1 Standards

The drainage design and construction criteria for the proposed improvements will adhere to FDOT Standards and will comply with the best management practices set forth in **Table 4-1**.

Table 4-1: Design Criteria

Design Element	Criteria	Source
Design Frequency		
Storm Drains	-10-Year design frequency standard (1, 8, 24-hour) -Check 100-Year storm (1, 8, 24 hour) -50-Year design frequency for interstate facility sag vertical curves which have no outlet other	D.M. Section 3.3
Cross Drains	-50-Year design frequency	D.M. Section 4.3
Design Tailwater		
All Conditions	-Conditions vary with outfall type	D.M. Section 3.4
Time Of Concentration (TOC)	-Minimum TOC of 10 Minutes -Other TOC calculations to follow NRCS TR-55	D.M. Section 3.5.1
Pipe Slopes		
Minimum	- Min. slope to produce v=2.5 ft/sec flowing full	D.M. Section 3.6.1
Manning's "n" Coefficient		
Pipes	- 0.012 (smooth pipes) 0.024 (corrugated pipe)	D.M. Section 3.6.4
Asphalt (rough texture)	- 0.016 Asphalt Pavement	D.D.G. Appendix B-2
Grades		
Longitudinal Gutter Grade	- minimum longitudinal gutter grade is 0.3%	D.M. Section 3.8.1
Spread Standards		
Design Speed ≤ 45	- Keep ½ lane clear	D.M. Section 3.9
45 < Design Speed ≤ 55	- Keep 8-ft of lane clear	
Design Speed >55	- No encroachment	
Pipe Size And Length		
Trunk Line	- 18-in Minimum Diameter.	D.M. Section 3.10.1
Length Between Structure	-18-in Pipe=300-ft -24-in–36-in=400-ft ->42-in =500-ft	D.M. Section 3.10.1
Exfiltration Trench		
Pipe Diameter	-24-in minimum	D.M. Section 3.10.1
Pipe Lengths	-Access through both ends: 300-ft 24-in to 30-in pipes; 400-ft for 36-in and larger pipes. -Access through only one end: 150ft 24-in to 30-in pipes; 200-ft 36-in and larger pipes	D.M. Section 3.10.1

Ground Water Clearance		
Dry Retention	- Pond bottom minimum 1-ft above SHGWT	B.M.P. Section VIII
Freeboard		
Storm Drain	-Hydraulic Gradeline Minimum 1-ft below theoretical gutter elevation -1.13-ft below E.O.P. for Types E & F curb and gutter -1-ft below grate elevation for inlets Standard Index, 220-221, 230-235, 217-219.	D.D.G. Section 6.5
Ponds	-Minimum 1-ft above peak design stage, measured from the inside edge of the maintenance berm.	D.M. Section 2.4.5
Permanent Pool Pond Depth		
Wet Detention	- 5-ft. minimum depth	D.D.G. Section 9.2.1.1
Stormwater Management System		
Water Quality	-Water quality standards, as set forth in Chapter 62-302, Florida Administrative Code.	V - I Section 1.4.2
Discharge Limitations	- Historic Discharges, Post <= Pre	V – II Section 3.2
Bridge Clearances		
Horizontal	-Center span – 25 feet clear bent spacing, measured perpendicular to the channel. Approach bents – 20 feet between faces of bents.	S.R.W. Page 69
Vertical	-6 feet above seasonal high optimum water control elevation, or 2 feet above the design water surface, whichever produces the greater elevation.	
Vertical	-2 feet minimum clearance between design flood stage and the low member of bridge to allow for debris passage. 6 feet above Normal High Water for controlled canals	P.P.M. 2.10.1

Abbreviations

- D.M. FDOT Drainage Manual; January 2017
- D.D.G. Drainage Design Guide; January 2017
- P.P.M. Plans Preparation Manual Volume 1; January 2017
- V-I SFWMD Environmental Resource Permit Applicant's Handbook Volume I; October 2013
- V-II SFWMD Environmental Resource Permit Applicant's Handbook Volume II; May 2016
- S.R.W. SFWMD Right of Way Criteria Manual; August 2013
- B.M.P SFWMD Best Management Practices for SF Urban Stormwater Management Systems; April 2002

4.2 Water Quality

The project is located in the jurisdiction of the SFWMD. All projects located in the jurisdiction of SFWMD are required to meet state water quality standards set forth in Chapter 62-302, Florida Administrative Code (FAC). The approach to meet water quality requirements is to provide treatment for the increase in impervious area and restore or replace existing permitted treatment facilities impacted by this project. See **Appendix C** for SFWMD meeting notes. An emphasis was placed on providing treatment for the increase in impervious area rather than providing treatment for the entire project area since the project is geometrically constrained due to the linear nature of the facility and limited right of way due to the heavily urbanized areas surrounding the study area. The following methodology was used to determine the treatment volume needed to meet SFWMD requirements:

1. Wet detention volume shall be provided for the first inch of runoff from the developed project, or the total runoff of 2.5 inches times the increase in imperviousness, whichever is greater.
2. Dry detention volume shall be provided for 75 percent of the above amounts computed for wet detention.
3. Retention volume shall be provided for 50 percent of the above amounts computed for wet detention.
4. Identify and quantify existing treatment impacted by the proposed roadway footprint and replace this treatment within the project area.

4.3 Water Quantity

4.3.1 SFWMD

According to the SFWMD Permit Information Manual Volume IV, Section 6.0, off-site discharge rate is limited to rates not causing adverse impacts to existing off-site properties, and:

1. Historic discharge rates, or
2. Rates determined in previous District permit actions, or
3. Rates specified in District criteria

SFWMD requires that a 3-day duration and 25-year return frequency be used in computing off-site discharge rates unless specified by previous District or District criteria.

The peak discharge for this project was estimated by using the SCS runoff curve number method as described in Technical Release 55 (TR-55), published in 1986 by the United States Department of Agriculture (USDA).

5 PRELIMINARY DRAINAGE ANALYSIS

The preliminary drainage analysis conducted for this study consisted of evaluating the project area to estimate the stormwater treatment and conveyance needs. The term stormwater treatment is used throughout this section to refer to both the water quality and peak attenuation requirements for a particular system. Typically, the greater of the two is provided to insure both requirements are met.

This section provides a summary of the preliminary drainage analysis. It follows the general format of identifying existing conditions and then providing recommended improvements that would be needed to accommodate additional runoff expected from the increase in impervious area (pavement) and reduced storage capacity due to encroachments into pond/treatment areas.

The preliminary drainage analysis consists of evaluating the preferred alternative, which includes improvements at Commercial Boulevard and Cypress Creek Road. The drainage analysis for Commercial Boulevard and Cypress Creek Road include proposed roadway improvements along I-95 mainline. In addition, improvements at Commercial Boulevard include roadway improvements at N. Andrews Avenue and Powerline Road. **Table 5-1** below provides the N. Andrews Avenue and Powerline Road improvement options for the preferred alternative, as explained in **Section 2.1**.

Table 5-1: Commercial Boulevard Alternative

Alt name.	N. Andrew Avenue Improvement	Powerline Road Improvement
Preferred	Partial Flyover Widening	At-grade

*For more information on the preferred alternative, please refer to the Preliminary Engineering Report.

5.1 Stormwater Management Systems

The project area was divided into four main drainage systems (i.e. Systems C13-SCOM, C13-NCOM, C14-SCYP and C14-NCYP), as shown below in **Figure 5-1**. The naming convention was chosen so that the first three characters represent the name of the receiving waterbody, followed by the fourth character which represents the location of the system with respect to the intersecting roadway at the interchange (i.e. Commercial Boulevard & Cypress Creek Road), and then by the last three characters which represent the name of the intersecting roadway at the interchange. These systems have a combined total area of 236 acres.

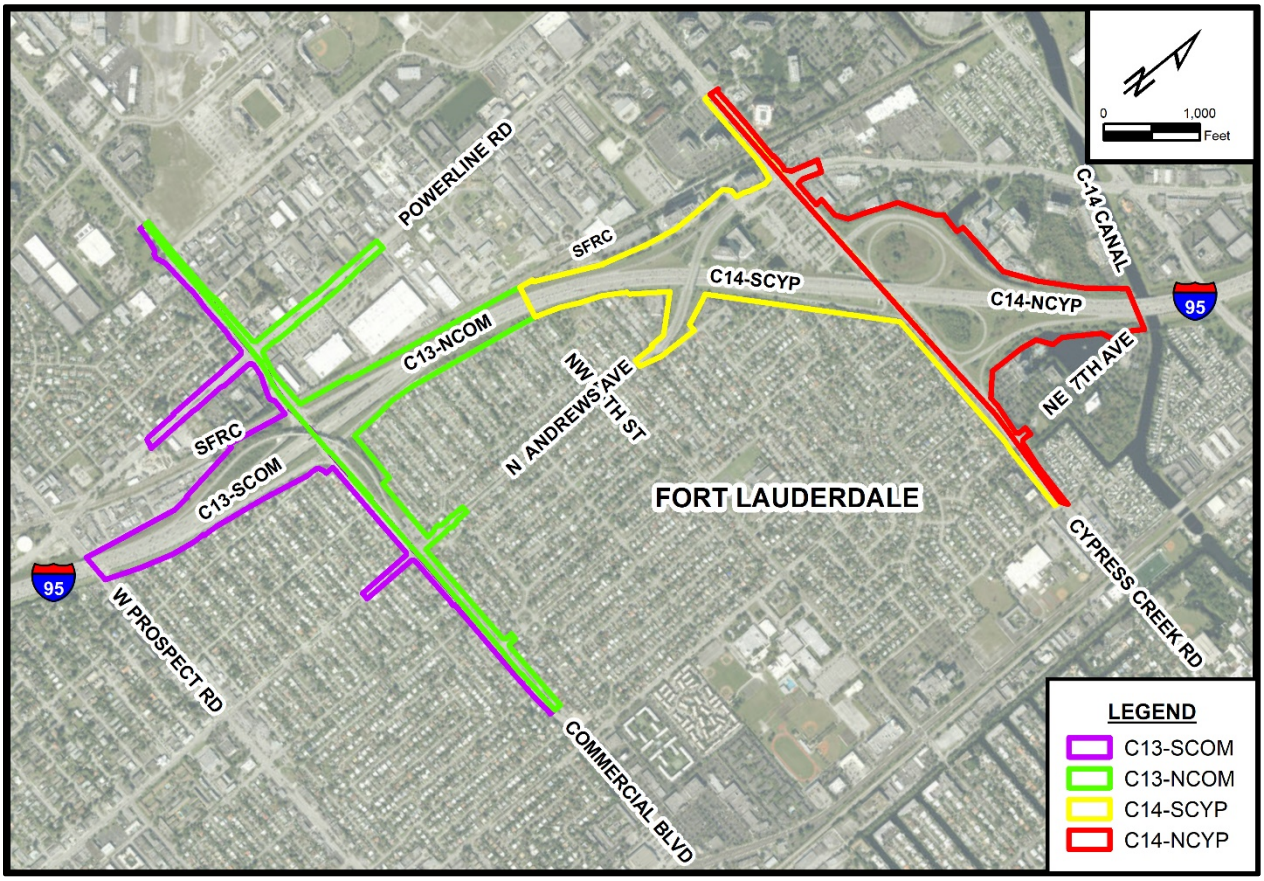


Figure 5-1: Drainage Systems

5.2 Methodology

The six general steps, outlined below, were followed to determine the stormwater management facilities needed to accommodate the proposed roadway improvements. **See Appendix B** for preliminary drainage analysis calculations.

1. Determine drainage system characteristics
    a. Establish begin and end stations.
    b. Calculate impervious, pervious, and total areas for pre-development and post-development.
2. Calculate water quality treatment to meet SFWMD Requirements
    a. Quantify existing water quality treatment.
    b. Calculate treatment volume needed for increase in impervious area.
    c. Multiple item 2b by 75% for dry detention ponds.
3. Calculate peak runoff volume (using NCRS Method)
    a. Determine design rainfall (25Y-72H).
    b. Calculate pre-development and post-development peak runoff.
4. Determine treatment volume needed for increased pavement area
    a. Select the greater of items, 2c and 3b.
5. Determine encroachment of proposed roadway into existing pond/treatment areas
    a. Determine length of roadway encroaching into pond/treatment area.
    b. Determine width of roadway encroaching into pond/treatment area.
    c. Determine area of encroachment by multiplying 5a by 5b.
    d. Determine volume of encroachment by multiplying 5c by depth of pond/treatment area.
6. Determine if additional treatment volume is needed
    a. Determine treatment volume required for existing permitted roadway.
    b. Determine treatment volume currently being provided.
    c. Determine surplus treatment volume by subtracting 6a from 6b.
    d. Determine treatment volume needed for proposed improvements by adding 4a and 5d.
    e. If 6c > 6d, surplus treatment volume currently in system can accommodate proposed improvements.
    f. If 6c < 6d, treatment volume to be provided is the difference between 6c and 6d.

5.3 System C13-SCOM

5.3.1 EXISTING CONDITION

System C13-SCOM covers I-95 from Prospect Road to Commercial Boulevard; Commercial Boulevard eastbound lanes from 400-ft west of NW 12 Avenue to 300-ft east of NE 4 Avenue; Powerline Road from just south of NW 47 Street to Commercial Boulevard; and N. Andrews Avenue from NW 48 Street to Commercial Boulevard. Refer to **Figure 5-2** for a map of the system. The drainage area is approximately 46 acres in size. A review of previous drainage plans and existing permit information shows that runoff is being collected and treated by various dry retention ponds. Generally, excess runoff from System C13-SCOM is being conveyed towards the south via roadside swales, pipes and culverts, and ultimately discharges into the C-13 Canal. There is one existing permit in this system, *SFWMD Permit 06-01465-S*, *Application 140516-1*.

System C13-SCOM is part of System 19E in the I-95 Express Lanes Phase 3A project. According to *SFWMD Permit 06-01465-S*, System 19E covers I-95 from just south of Powerline Road to NW 55 Street. The permit shows that the existing surplus capacity available in the portion of System 19E south of the project area (System C13-OTHER) is 2.43 ac-ft. (Treatment volume provided of 6.12 ac-ft. – Treatment volume required of 3.69 ac-ft.). This surplus capacity is available in the interconnected treatment areas (swales and ponds) just south of the project area and will be used to provide treatment for the proposed roadway improvements. See **Appendix E** for permit excepts.

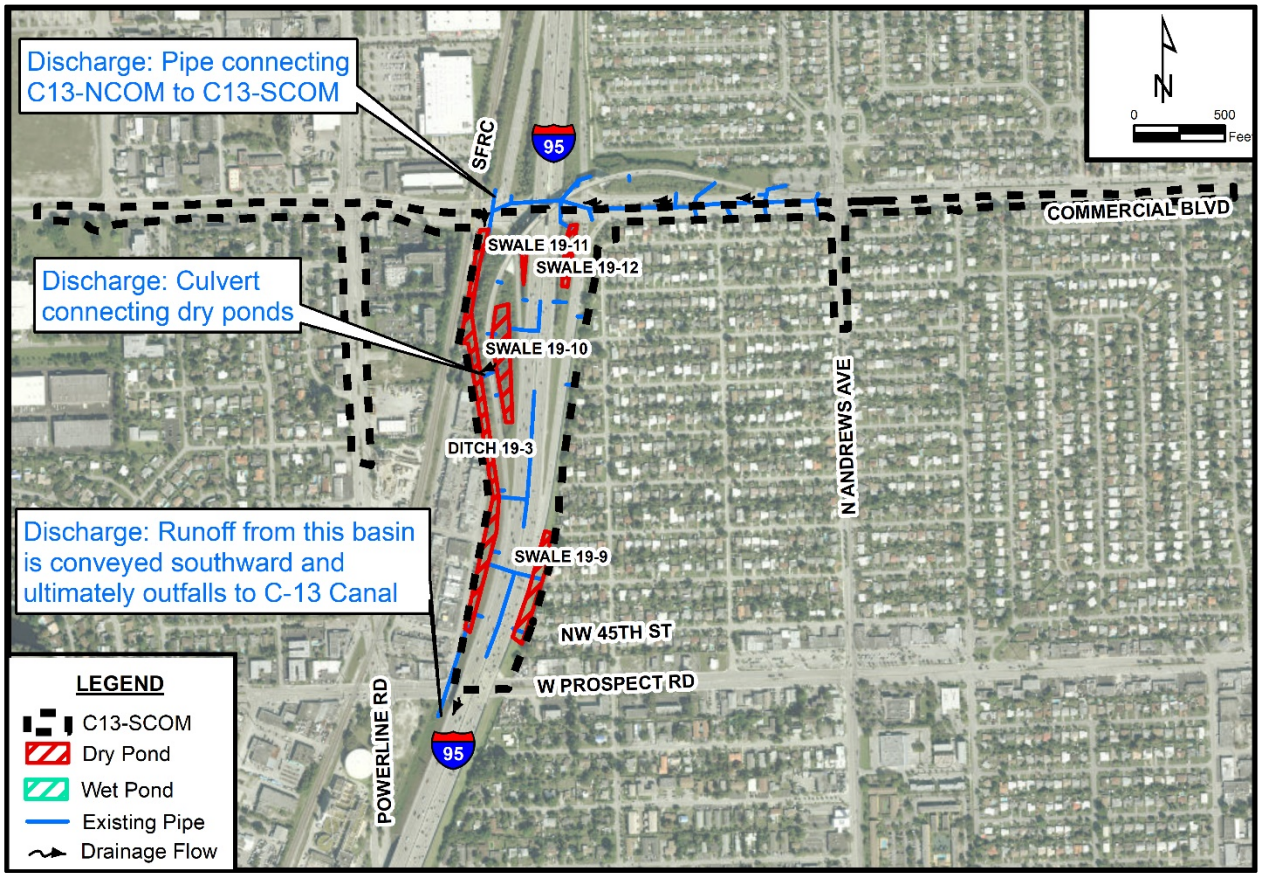


Figure 5-2: System C13-SCOM

5.3.2 PREFERRED ALTERNATIVE

The proposed improvements under this alternative will add 1.37 acres of impervious (pavement) area to the drainage system. Preliminary drainage calculations indicate that a wet-detention pond providing 0.28 ac-ft. of volume will be needed to treat and attenuate runoff as a result of the increased pavement area. The estimated pond encroachment due to the proposed roadway improvements will be 0.02 ac-ft. Therefore, the total treatment volume required will be 0.30 ac-ft. (Treatment volume for increased pavement of 0.28 ac-ft. + Pond encroachment volume of 0.02 ac-ft.).

The total treatment volume provided to accommodate the proposed roadway improvements for this system is 2.37 ac-ft. (Existing surplus in System C13-OTHER of 2.43 ac-ft. + Existing surplus in System C13-SCOM of (-)0.06ac-ft.). The available surplus capacity to remain in System C13-OTHER after System C13-SCOM is treated, under the preferred alternative, will be 2.07 ac-ft. (Total treatment volume provided of 2.37 ac-ft. – Total treatment volume required of 0.30 ac-ft.). No offsite ponds or right of way acquisitions are needed for this drainage system.

See **Table 5-2** for the treatment volume summary for System C13-SCOM and **Appendix B** for preliminary drainage calculations.

Table 5-2: System C13-SCOM Treatment Volume Summary

Comm. Alt.	Exist.[1] Surplus (ac-ft.)	Increased Imp. Area (acres)	Addtn.[2] Treat. Req'd (ac-ft.)	Encroach. Vol. (ac-ft.)	Total[3] Treat. Req'd (ac-ft.)	Total[4] Treat. Prov'd (ac-ft.)	Treat.[5] Balance (ac-ft.)
1	-0.06	1.37	0.28	0.02	0.30	2.37	2.07

[1]Existing Surplus = (Existing treatment provided in a basin) - (Existing treatment required in a basin).

[2]The additional treatment required due to the increase in impervious area.

[3]Total Treat. Req'd = (Addtn. Treat. Req'd) + (Encroach. Vol.)

[4]Total Treat. Prov'd = (Existing surplus in System C13-OTHER) + (Existing surplus in System C13-SCOM)

[5]Treat. Balance = (Total Treat. Prov'd) – (Total Treat. Req'd). This means the surplus capacity to remain in System C13-OTHER after System C13-SCOM is treated.

5.4 System C13-NCOM

5.4.1 EXISTING CONDITION

System C13-NCOM covers I-95 from Commercial Boulevard to NW 55 Street; Commercial Boulevard westbound lanes from 400-ft west of NW 12 Avenue to 300-ft east of NE 4 Avenue; and Powerline Road from Commercial Boulevard to just north of NW 53 Street. Refer to **Figure 5-3** for a map of the system. The drainage area is approximately 47 acres in size. A review of previous drainage plans and existing permit information shows that runoff is being collected and treated by various dry retention ponds. Generally, excess runoff from System C13-NCOM is being conveyed towards the south via roadside swales, pipes and culverts, and ultimately discharges into the C-13 Canal. There is one existing permit in this system, *SFWMD Permit 06-01465-S*, Application 140516-1.

System C13-SCOM is part of System 19E in the I-95 Express Lanes Phase 3A project. According to *SFWMD Permit 06-01465-S*, System 19E covers I-95 from just south of Powerline Road to NW 55 Street. The permit shows that the existing surplus capacity available in the portion of System 19E south of the project area (System C13-OTHER) is 2.43 ac-ft. (Treatment volume provided of 6.12 ac-ft. – Treatment volume required of 3.69 ac-ft.). This surplus capacity is available in the interconnected treatment areas (swales and ponds) just south of the project area and will be used to provide treatment for the proposed roadway improvements. See **Appendix E** for permit excepts.

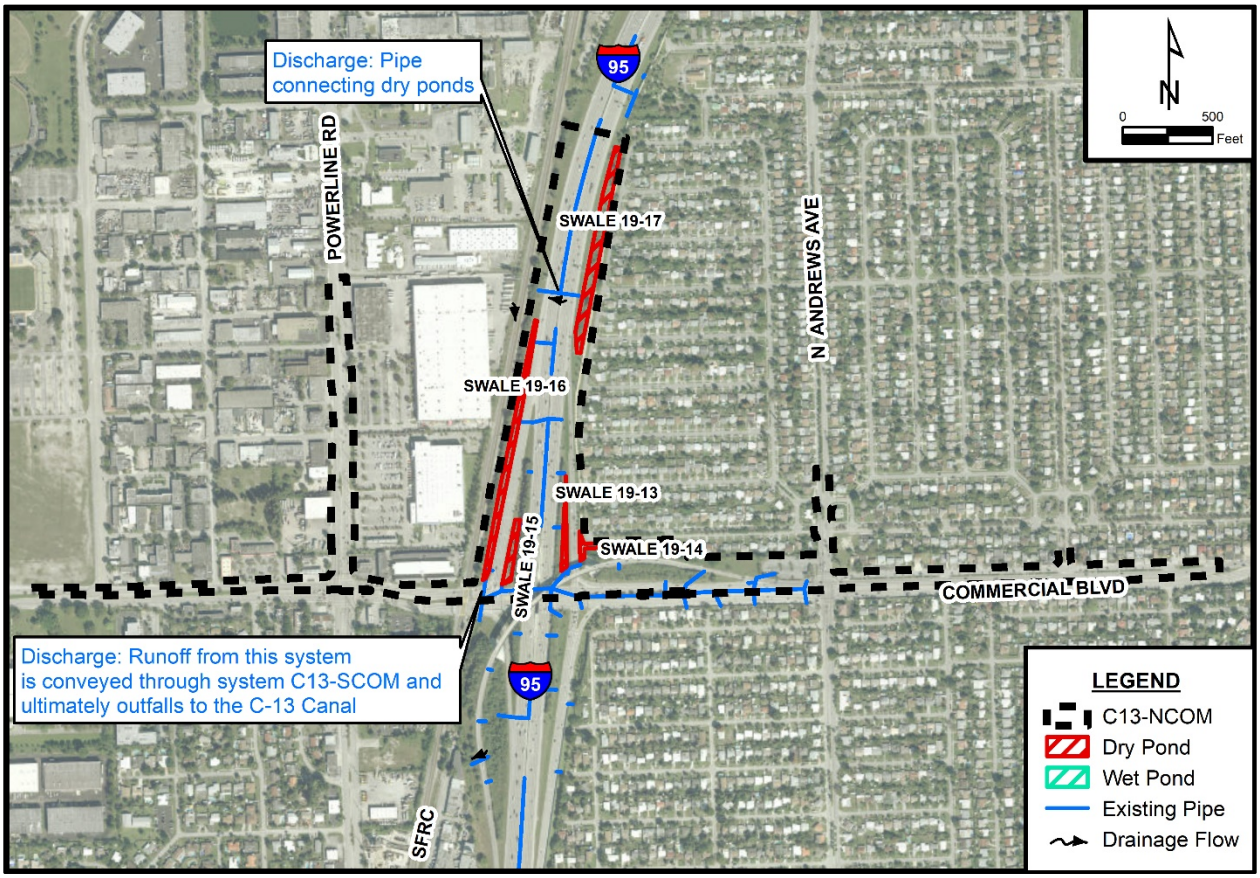


Figure 5-3: C13-NCOM Drainage System

5.4.2 PREFERRED ALTERNATIVE

The proposed improvements under this alternative will add 3.67 Acres of impervious (pavement) area to the drainage system. Preliminary drainage calculations indicate that a wet-detention pond providing 0.76 ac-ft. of volume will be needed to treat and attenuate runoff as a result of the increased pavement area. The estimated pond encroachment due to the proposed roadway improvements will be 0.30 ac-ft. Therefore, the total treatment volume required will be 1.06 ac-ft. (Treatment volume for increased pavement of 0.76 ac-ft. + Pond encroachment volume of 0.30 ac-ft.).

The total treatment volume provided to accommodate the proposed roadway improvements for this system is 1.75 ac-ft. (Surplus in System C13-OTHER after System C13-SCOM is treated of 2.07 ac-ft. + Existing surplus in System C13-NCOM of (-)0.32 ac-ft.). The available surplus capacity to remain in System C13-OTHER after System C13-NCOM is treated, under the preferred alternative, will be 0.69ac-ft. (Total treatment volume provided of 1.75 ac-ft. – Total treatment volume required of 1.06 ac-ft.). No offsite ponds or right of way acquisitions are needed for this system.

See **Table 5-3** for the treatment volume summary for System C13-NCOM and **Appendix B** for preliminary drainage calculations.

Table 5-3: System C13-NCOM Treatment Volume Summary

Comm. Alt.	Exist. Surplus (ac-ft.)	Increased Imp. Area (acres)	Addtn. Treat. Req'd (ac-ft.)	Encroach. Vol. (ac-ft.)	Total Treat. Req'd (ac-ft.)	Total[1] Treat. Prov'd (ac-ft.)	Treat.[2] Balance (ac-ft.)
1	-0.32	3.67	0.76	0.30	1.06	1.75	0.69

[1]Total Treat. Prov'd = (Surplus available in System C13-OTHER after System C13-SCOM is treated) + (Existing surplus in System C13-NCOM)

[2]Treat. Balance = (Total Treat. Prov'd) – (Total Treat. Req'd). This means the surplus capacity to remain in System C13-OTHER after both Systems C13-SCOM and C13-NCOM are treated.

5.5 System C14-SCYP

5.5.1 EXISTING CONDITION

System C14-SCYP covers I-95 from NW 55 Street to Cypress Creek Road; Cypress Creek Road eastbound lanes from NW 6 Way to NE 9 Avenue; and N. Andrews Avenue from NE 57 Court to Cypress Creek Road. Refer to **Figure 5-4** for a map of the system. The drainage area is approximately 74 acres in size. A review of previous drainage plans and existing permit information shows that runoff is being collected and treated by various dry and wet detention ponds. Generally, excess runoff from System C14-SCYP is being conveyed towards the north via roadside swales, pipes and culverts, and ultimately discharges into the C-14 Canal. There is one existing permit in this system, SFWMD Permit 06-01465-S, Application 140516-1.

System C14-SCYP is part of System 20 in the I-95 Express Lanes Phase 3A project. According to SFWMD Permit 06-01465-S, System 20 covers I-95 from NW 55 Street to the C-14 Canal. The permit shows that existing treatment volume required and provided for System 20 are 11.41 and 11.47 ac-ft., respectively. As such, according to the permit, System 20 has a surplus capacity of 0.06 ac-ft. (Provided treatment of 11.47 ac-ft. – Required Treatment of 11.41 ac-ft.). Based on permit information, it was determined that the existing treatment areas in System C14-SCYP are deficient in treating runoff, south of Cypress Creek Road, by 3.54 ac-ft. However, it was determined that System C14-NCYP, north of Cypress Creek Road, has an existing surplus capacity of 3.60 ac-ft. See **Appendix E** for permit excepts.

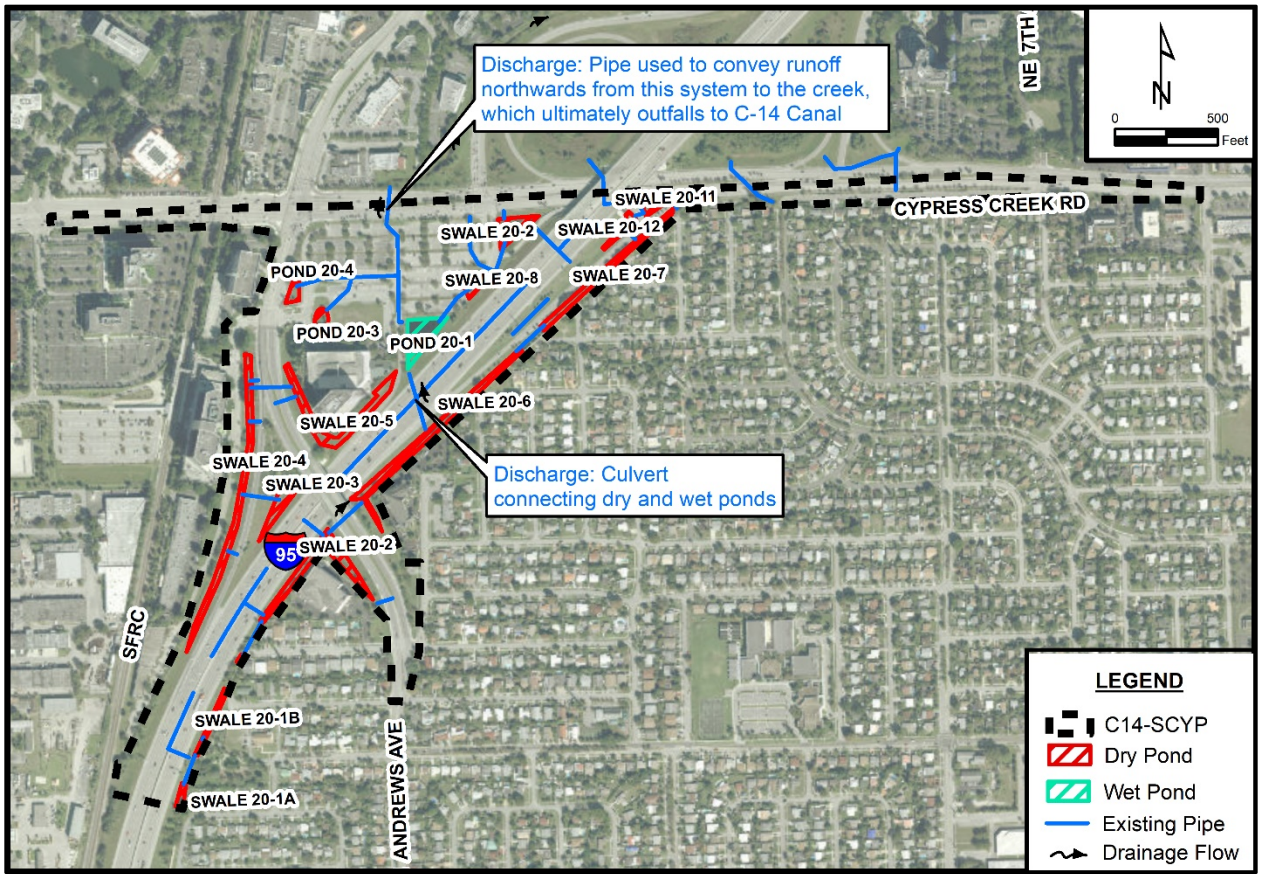


Figure 5-4: C14-SCYP Drainage System

5.5.2 PREFERRED ALTERNATIVE

The proposed improvements under this alternative will add 5.52 acres of impervious (pavement) area to the drainage system. Preliminary drainage calculations indicate that a wet-detention pond providing 1.15 ac-ft. of volume will be needed to treat and attenuate runoff as a result of the increased pavement area. The estimated pond encroachment due to the proposed roadway improvements will be 0.62 ac-ft. Therefore, the total treatment volume required will be 1.77 ac-ft. (Treatment volume for increased pavement of 1.15 ac-ft. + Pond encroachment volume of 0.62 ac-ft.).

The approach to meet water quality requirements for System C14-SCYP is to account for the surplus treatment in System C14-NCYP of 6.23 ac-ft. Using this approach, an additional 2.69 ac-ft. (Surplus in System C14-NCYP of 6.23 ac-ft. + Existing Surplus in System C14-SCYP of (-) 3.54 ac-ft.) of treatment volume will be provided and will be sufficient to accommodate the proposed roadway improvements. The available surplus capacity to remain in System C14-NCYP after System C14-SCYP is treated will be 0.92 ac-ft. (Total treatment volume provided of 2.69 ac-ft. – Total treatment volume required of 1.77 ac-ft.). As such, no offsite ponds or right of way acquisitions are needed.

See **Table 5-4** for the treatment volume summary for System C14-SCYP and **Appendix B** for preliminary drainage calculations.

Table 5-4: System C14-SCYP Treatment Volume Summary

Cypress Alt.	Exist. Surplus (ac-ft.)	Increased Imp. Area (acres)	Addtn. Treat. Req'd (ac-ft.)	Encroach. Vol. (ac-ft.)	Total Treat. Req'd (ac-ft.)	Total[1] Treat. Prov'd (ac-ft.)	Treat.[2] Balance (ac-ft.)
1	-3.54	5.52	1.15	0.62	1.77	2.69	0.92

[1]Total Treat. Prov'd = (Surplus in System C14-NCYP) + (Existing surplus in System C14-SCYP)

[2]Treat. Balance = (Total Treat. Prov'd) – (Total Treat. Req'd). This means the surplus capacity to remain in System C14-NCYP after both Systems C14-SCYP and C13-NCYP are treated.

5.6 System C14-NCYP

5.6.1 EXISTING CONDITION

System C14-NCYP covers I-95 from Cypress Creek Road to the C14-Canal; Cypress Creek Road westbound lanes from NW 6 Way to NE 9 Avenue; and N. Andrews Avenue from NE 57 Court to Cypress Creek Road. Refer to **Figure 5-5** for a map of the system. The drainage area is approximately 69 acres in size. A review of previous drainage plans and existing permit information shows that runoff is being collected and treated by various dry detention ponds. Generally, excess runoff from System C14-NCYP is being conveyed towards the north via roadside swales, pipes and culverts, and ultimately discharges into the C-14 Canal. There is one existing permit in this system, SFWMD Permit 06-01465-S, Application 140516-1.

System C14-SCYP is part of System 20 in the I-95 Express Lanes Phase 3A project. According to SFWMD Permit 06-01465-S, System 20 covers I-95 from NW 55 Street to the C-14 Canal. The permit shows that existing treatment volume required and provided for System 20 are 11.41 and 11.47 ac-ft., respectively. As such, according to the permit, System 20 has a surplus capacity of 0.06 ac-ft. (Provided treatment of 11.47 ac-ft. – Required Treatment of 11.41 ac-ft.). Based on permit information, it was determined that the existing treatment areas in System C14-SCYP are deficient in treating runoff, south of Cypress Creek Road, by 3.54 ac-ft. However, it was determined that System C14-NCYP, north of Cypress Creek Road, has an existing surplus capacity of 3.60 ac-ft. See **Appendix E** for permit excepts.

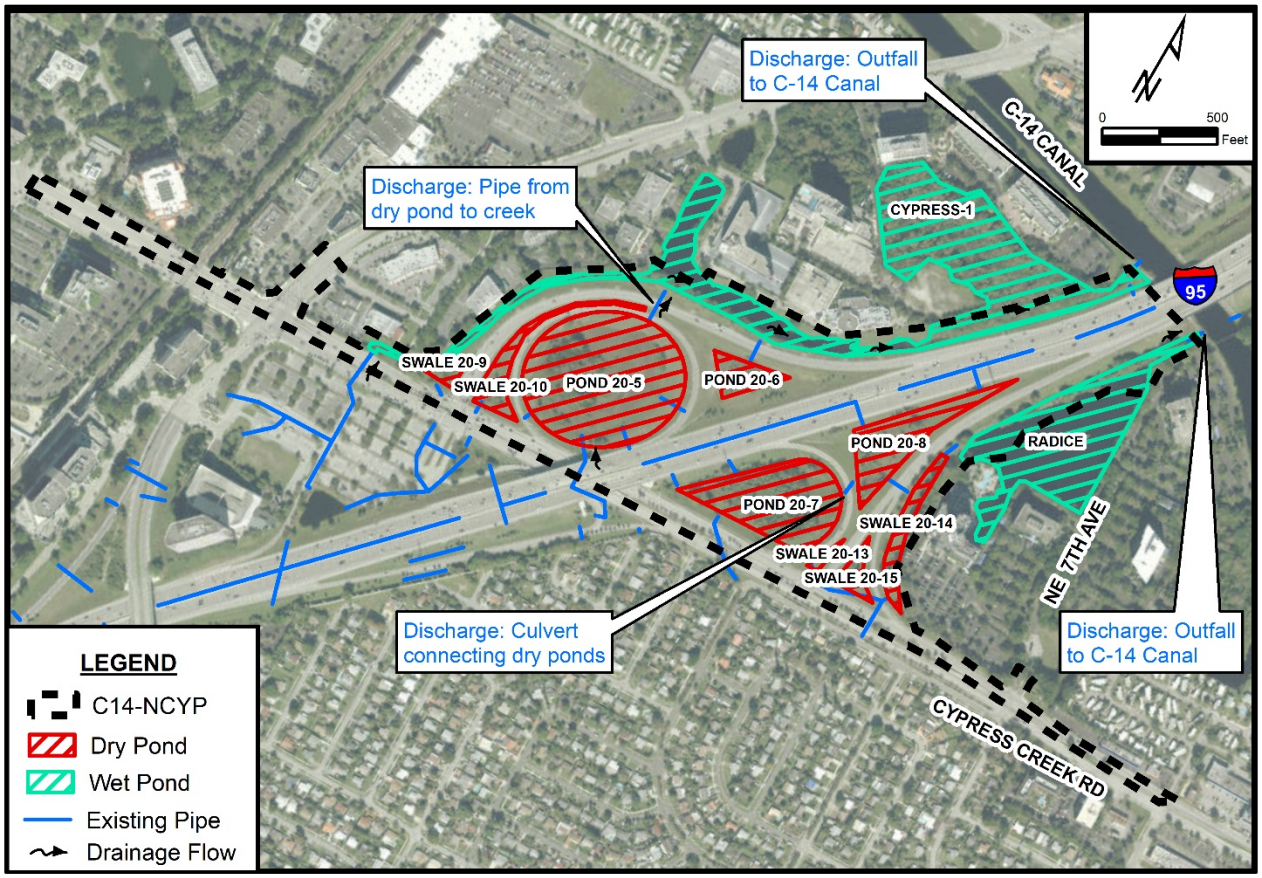


Figure 5-5: C14-NCYP Drainage System

5.6.2 PREFERRED ALTERNATIVE

The proposed improvements under this alternative will add 0.20 acres of impervious (pavement) area to the drainage system. Preliminary drainage calculations indicate that a wet-detention pond providing 0.04 ac-ft. of volume will be needed to treat and attenuate runoff as a result of the increased pavement area. There are no estimated pond encroachment due to the proposed roadway improvements. Therefore, the total treatment volume required will be 0.04 ac-ft. (Treatment volume for increased pavement of 0.04 ac-ft. + Pond encroachment volume of 0.00 ac-ft.).

The approach to meet water quality requirements for System C14-NCYP is to account for the existing surplus capacity of 3.60 ac-ft. which is sufficient to accommodate the proposed roadway improvements. The control structures for various interconnected dry detention ponds will be raised 2-inches to accommodate the roadway improvements in System C14-SCYP. Raising the pond control structures will provide an additional treatment volume of 2.67 ac-ft. As such, the total surplus capacity that will be available after this system is treated is 6.23 ac-ft. (Existing surplus capacity of 3.60 ac-ft. + Additional treatment volume of 2.67 ac-ft. – Treatment volume required of 0.04 ac-ft.). No offsite ponds or right of way acquisitions are needed for System C14-NCYP.

See **Table 5-5** for the treatment volume summary for System C14-NCYP. and **Appendix B** for preliminary drainage calculations.

Table 5-5: System C14-NCYP Treatment Volume Summary

Cypress Alt.	Exist. Surplus (ac-ft.)	Increased Imp. Area (acres)	Addtn. Treat. Req'd (ac-ft.)	Encroach. Vol. (ac-ft.)	Total Treat. Req'd (ac-ft.)	Total[1] Treat. Prov'd (ac-ft.)	Treat. Balance (ac-ft.)
1	3.60	0.20	0.04	0.00	0.04	6.27	6.23

[1]Total Treat. Prov'd = (Existing Surplus in System C14-NCYP) + (New treatment provided by increasing the control structures of the ponds)

5.7 Water Treatment Summary

Table 5-6 below provides the required treatment volume, proposed treatment volume, and treatment balance for each system.

Table 5-6: Treatment Summary

SYSTEM NAME	Preferred		
	RT[1] (ac-ft)	PT[2] (ac-ft)	TB[3] (ac-ft)
C13-SCOM	0.30	2.37	2.07
C13-NCOM	1.06	1.75	0.69[4]
C14-SCYP	1.77	2.69	0.92[5]
C14-NCYP	0.04	6.27	6.23

NOTES:

1. **RT** = Required treatment, total treatment required to accommodate the proposed improvements. It includes the sum of the treatment volume needed for the increase in imperious area and encroachment volume into permitted treatment areas.
2. **PT** = Provided Treatment, treatment volume to be provided including both existing surplus and proposed new treatment volumes.
3. **TB** = Treatment Balance = PT (Provided Treatment) – RT (Required treatment)
4. Surplus capacity to remain in System C13-OTHER after both Systems C13-SCOM and C13-NCOM are treated.
5. Surplus capacity to remain in System C14-NCYP after System C14-SCYP is treated.

6 FLOODPAIN IMPACTS

I-95 is designated as an evacuation route along the east coast of Florida. A review of the Flood Insurance Rate Map published by Federal Emergency Management Agency (FEMA), indicates that a portion of the study area is located in Special Flood Zones AE, AH and X. See **Figure 6-1** below. Areas identified in zone AE have a 1% annual chance of flooding during the Base Flood (100-year flood) with base elevations ranging from 6.0-ft. to 9.0-ft. NAVD (7.6-ft. to 10.6-ft. NGVD) within the project area. Areas identified in zone AH have a 1% annual chance of flooding during the Base Flood (100-year flood) with base elevations ranging from 7.0-ft. to 11.0-ft. NAVD (8.6-ft. to 12.6-ft. NGVD) and flood depths ranging from 1 to 3 feet. Areas identified in zone X are estimated to have less than 1 foot or no flooding at all during the Base Flood. Refer to FEMA FIRMette and 60% Draft Location Hydraulics Memorandum in **Appendix A**.

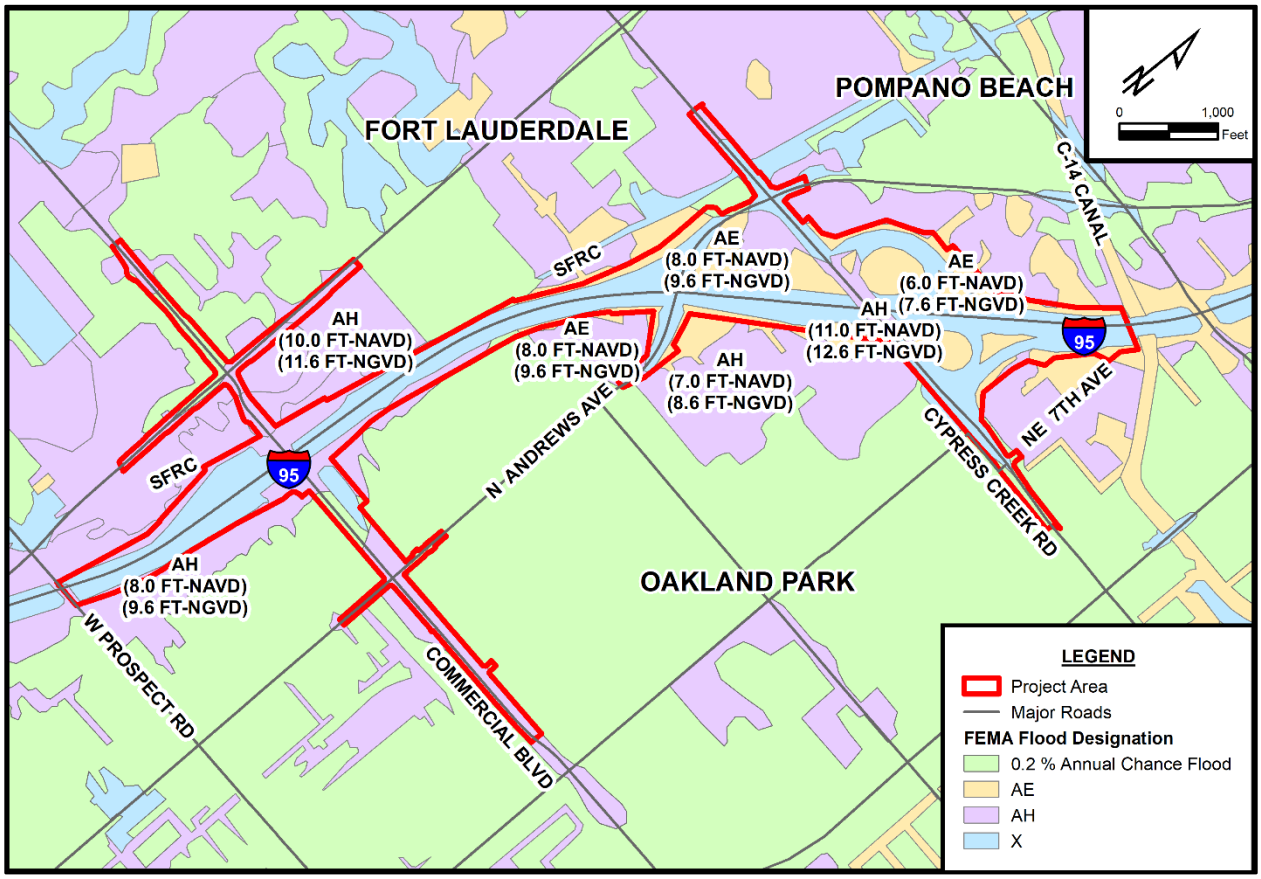


Figure 6-1: FEMA Flood Insurance Rate Map

7 CROSS DRAINS

There are no major cross drains in the project area.

8 WATERBODY CROSSING

There are no water body crossings in the project area.

9 PERMITTING

9.1 Existing Permits

The South Florida Water Management District (SFWMD) existing permits in the study area were obtained. Relevant permits are summarized below. Refer to **Appendix E** for excerpts from these permits.

SFWMD Permit 06-01465-S, Application 140516-1

- Issued 2014
- Construction and operation of a stormwater management system to serve improvements to a project known as I-95 Express Lanes Phase 3A. Main sources of water quality treatment may include dry/wet detention ponds, dry/wet retention ponds and exfiltration trenches. Receiving waterbodies include C-13, C-14, and North and South Fork of the New River.
- Sub-System 19E (Systems C13-SCOM & C13-NCOM) has 2.05 ac-ft. of surplus capacity
- System 20 (Systems C14-SCYP & C14-NCYP) has 0.06 ac-ft. of surplus capacity

9.2 Proposed Permits

The recommended permitting approach is to modify existing SFWMD Permit 06-01465-S. See **Appendix C** for SFWMD Meeting Notes.

10 CONCLUSION

The approach to meet water quality requirements for Systems C13-SCOM and C13-NCOM, under all of the Commercial Boulevard alternatives, is to account for the existing surplus capacity (2.43 ac-ft.) that is available in the interconnected treatment areas (swales and ponds) just south of these systems. Runoff from Systems C13-SCOM and C13-NCOM will enter these treatment areas before discharging into the C13-Canal.

The approach to meet water quality requirements for System C14-SCYP, for the preferred alternative, is to account for the surplus capacity that is available in System C14-NCYP. In addition, the control structures for various interconnected dry detention ponds in System C14-NCYP will be raised 2 inches. These ponds include Pond 5, Pond 6, Pond 7, Pond 8, Swale 9, Swale 10, and Swale 14. Using this approach, 6.23 ac-ft. of treatment volume will be provided and will be sufficient to accommodate the proposed roadway improvements for System C14-SCYP. The approach to meet water quality requirements for System C14-NCYP is to treat the additional runoff using the existing treatment areas with surplus capacity. Based on information obtained from SFWMD Permit 06-01465-S, it was determined that the existing treatments areas in System C14-NCYP have a surplus capacity of 3.60 ac-ft. which is sufficient to accommodate the proposed roadway improvements, under the preferred alternative. See **Appendix C** for SFWMD meeting notes with the abovementioned approach.

Table 10-1: Water Treatment Summary

Receiving Waterbody	Preferred Alternative		
	RT[1] (ac-ft.)	PT[2] (ac-ft.)	TB[3] (ac-ft.)
C13 Canal	1.36	2.05	0.69
C14 Canal	1.81	2.73	0.92

[1]RT = Required treatment, total treatment required to accommodate the proposed improvements. It includes the sum of the treatment volume needed for the increase in imperious area and encroachment volume into permitted treatment areas.

[2]PT = Provided Treatment, treatment volume to be provided including both existing surplus and proposed new treatment volumes.

[3]TB = Treatment Balance = PT (Provided Treatment) – RT (Required treatment)

Based on preliminary calculations, the stormwater management systems proposed by this study meet existing water quality standards as set forth in Chapter 62-302 of the Florida Administrative Code. Additionally, the treatment/storage quantity provided exceeds the required amount for each Proposed Build Alternative. See **Table 10-1** above. The approach that was used to meet water quality requirements is to provide treatment for the increase in impervious area and restore or replace existing permitted treatment facilities impacted by this project. Following this approach, no offsite ponds or right of way acquisition is needed to meet current permitting requirements.

11 REFERENCES

1. FDOT Drainage Manual; January 2017
2. Drainage Design Guide; January 2017
3. Plans Preparation Manual Volume 1; January 2017
4. SFWMD Permit Information Manual Volume IV; 2012
5. SFWMD BMP for SF Urban Stormwater Management Systems; April 2002
6. SFWMD Permit Information Manual Volume V; 1999

APPENDIX A

(Figures and Maps)

A1: Fort Lauderdale Zoning Map

A2: Vertcon Datum Conversion

A3: Broward County Wellfield Map

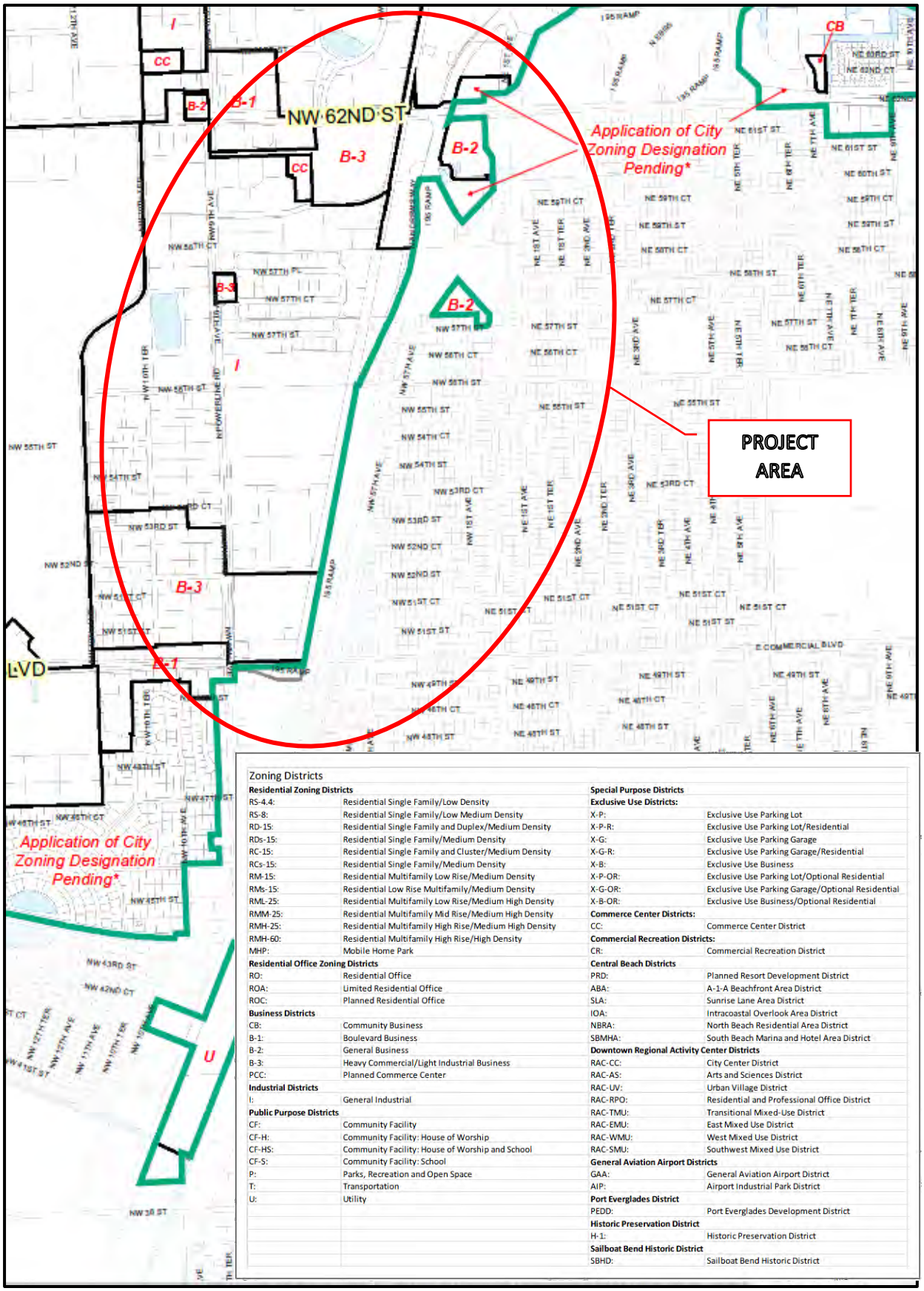
A4-6: NRCS Soil Survey Maps

A7: Broward County Average October Ground Water Level Map

A8: SFWMD 25 Year – 3 Day Rainfall Map

A9-13: FEMA Flood Insurance Map

A14-22: Draft Final Location Hydraulics Memorandum



Zoning Districts

Residential Zoning Districts		**Special Purpose Districts**	
RS-4.4:	Residential Single Family/Low Density	**Exclusive Use Districts:**	
RS-8:	Residential Single Family/Low Medium Density	X-P:	Exclusive Use Parking Lot
RD-15:	Residential Single Family and Duplex/Medium Density	X-P-R:	Exclusive Use Parking Lot/Residential
RDs-15:	Residential Single Family/Medium Density	X-G:	Exclusive Use Parking Garage
RC-15:	Residential Single Family and Cluster/Medium Density	X-G-R:	Exclusive Use Parking Garage/Residential
RCs-15:	Residential Single Family/Medium Density	X-B:	Exclusive Use Business
RM-15:	Residential Multifamily Low Rise/Medium Density	X-P-OR:	Exclusive Use Parking Lot/Optional Residential
RMs-15:	Residential Low Rise Multifamily/Medium Density	X-G-OR:	Exclusive Use Parking Garage/Optional Residential
RML-25:	Residential Multifamily Low Rise/Medium High Density	X-B-OR:	Exclusive Use Business/Optional Residential
RMM-25:	Residential Multifamily Mid Rise/Medium High Density	**Commerce Center Districts:**	
RMH-25:	Residential Multifamily High Rise/Medium High Density	CC:	Commerce Center District
RMH-60:	Residential Multifamily High Rise/High Density	**Commercial Recreation Districts:**	
MHP:	Mobile Home Park	CR:	Commercial Recreation District
Residential Office Zoning Districts		**Central Beach Districts**	
RO:	Residential Office	PRD:	Planned Resort Development District
ROA:	Limited Residential Office	ABA:	A-1-A Beachfront Area District
ROC:	Planned Residential Office	SLA:	Sunrise Lane Area District
Business Districts		IOA:	Intracoastal Overlook Area District
CB:	Community Business	NBRA:	North Beach Residential Area District
B-1:	Boulevard Business	SBMHA:	South Beach Marina and Hotel Area District
B-2:	General Business	**Downtown Regional Activity Center Districts**	
B-3:	Heavy Commercial/Light Industrial Business	RAC-CC:	City Center District
PCC:	Planned Commerce Center	RAC-AS:	Arts and Sciences District
Industrial Districts		RAC-UV:	Urban Village District
I:	General Industrial	RAC-RPO:	Residential and Professional Office District
Public Purpose Districts		RAC-TMU:	Transitional Mixed-Use District
CF:	Community Facility	RAC-EMU:	East Mixed Use District
CF-H:	Community Facility: House of Worship	RAC-WMU:	West Mixed Use District
CF-HS:	Community Facility: House of Worship and School	RAC-SMU:	Southwest Mixed Use District
CF-S:	Community Facility: School	**General Aviation Airport Districts**	
P:	Parks, Recreation and Open Space	GAA:	General Aviation Airport District
T:	Transportation	AIP:	Airport Industrial Park District
U:	Utility	**Port Everglades District**	
		PEDD:	Port Everglades Development District
		Historic Preservation District	
		H-1:	Historic Preservation District
		Sailboat Bend Historic District	
		SBHD:	Sailboat Bend Historic District

Questions concerning the VERTCON process may be mailed to _NGS

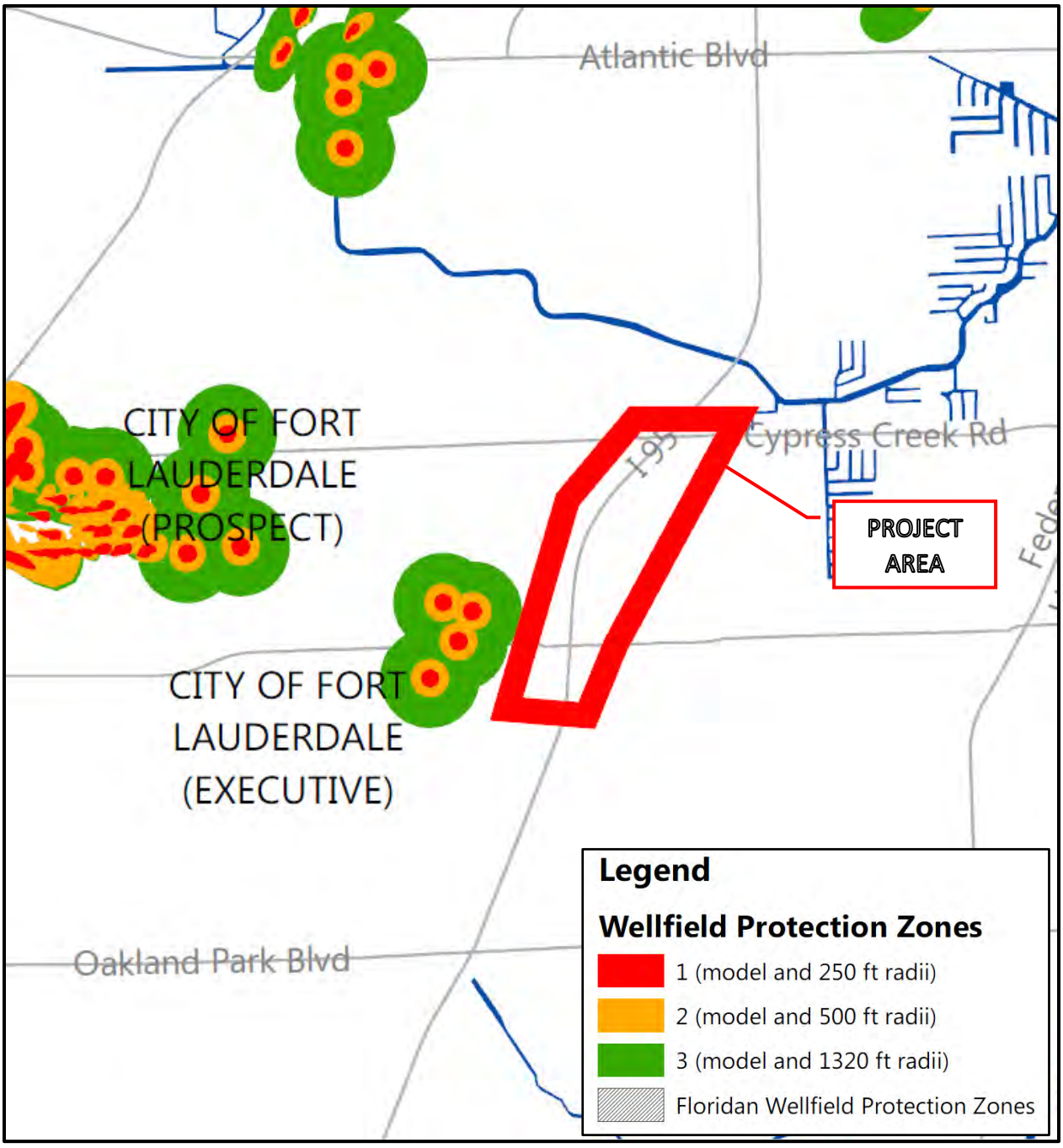
Latitude: 26 11 55.000

Longitude: 080 08 55.000

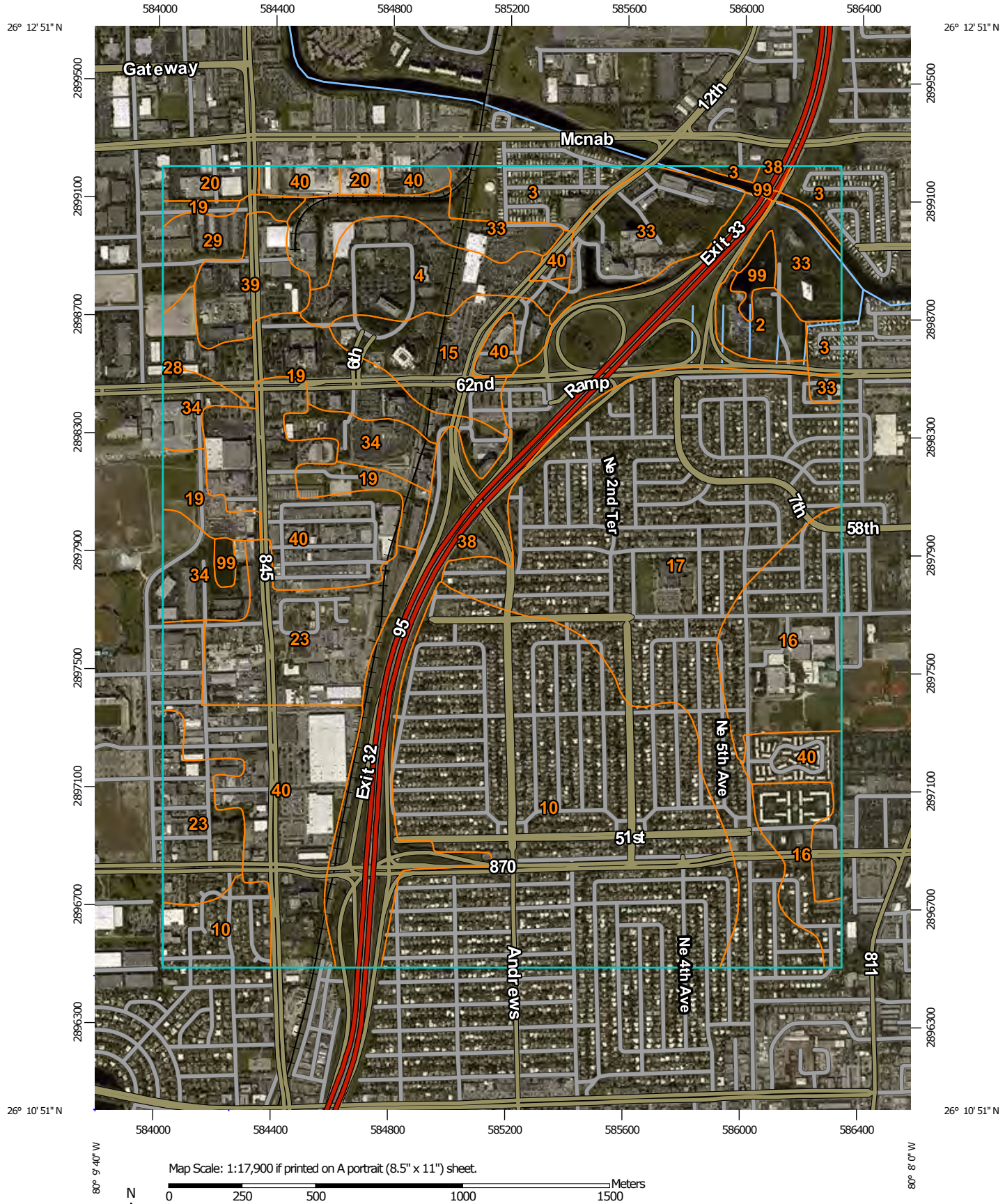
NGVD 29 height: 0000.00 FT

Datum shift(NAVD 88 minus NGVD 29): -1.585 feet

Converted to NAVD 88 height: -1.585 feet


Atlantic Blvd
CITY OF FORT LAUDERDALE (PROSPECT)
I-95
Cypress Creek Rd
PROJECT AREA
CITY OF FORT LAUDERDALE (EXECUTIVE)
Oakland Park Blvd
Legend
Wellfield Protection Zones
1 (model and 250 ft radii)
2 (model and 500 ft radii)
3 (model and 1320 ft radii)
Floridan Wellfield Protection Zones

Soil Map—Broward County, Florida, East Part
(I-95 Commercial Blvd To Cypress Creek Rd)



Map Scale: 1:17,900 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 250 500 1000 1500

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Broward County, Florida, East Part
Survey Area Data: Version 11, Nov 19, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 17, 2014—Feb 11, 2015

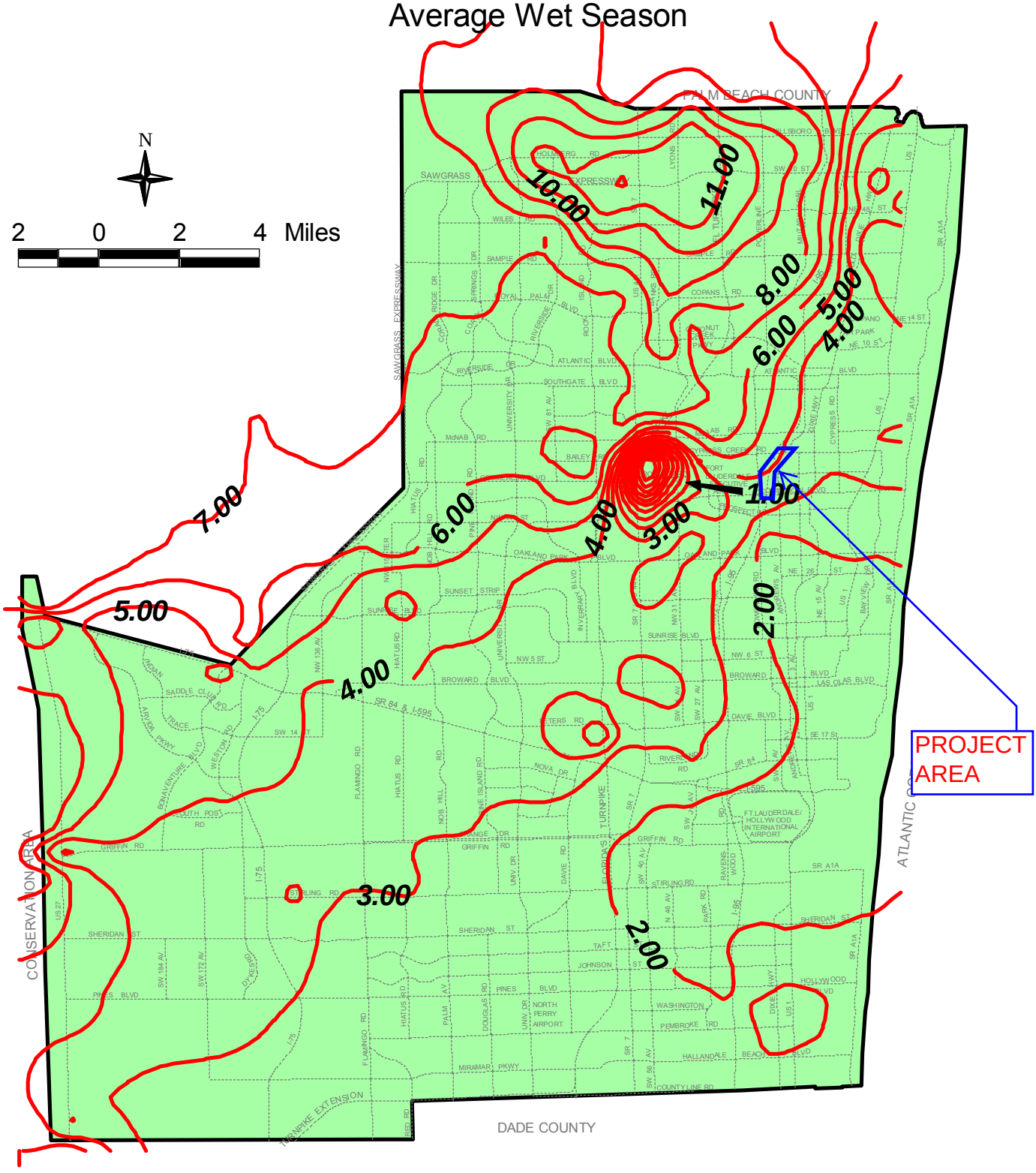
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Broward County, Florida, East Part (FL606)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
2	Arents-Urban land complex	15.6	1.0%
3	Arents, organic substratum-Urban land complex	40.7	2.6%
4	Basinger fine sand, 0 to 2 percent slopes	47.4	3.0%
10	Duette-Urban land complex	315.7	20.2%
15	Immokalee fine sand, 0 to 2 percent slopes	42.6	2.7%
16	Immokalee, limestone substratum-Urban land complex	86.4	5.5%
17	Immokalee-Urban land complex	265.9	17.0%
19	Margate fine sand	80.1	5.1%
20	Matlacha, limestone substratum-Urban land complex	12.5	0.8%
23	Paola-Urban land complex	92.7	5.9%
28	Pomello fine sand, 0 to 2 percent slopes	0.5	0.0%
29	Pompano fine sand, 0 to 2 percent slopes	17.8	1.1%
33	Sanibel muck	94.8	6.1%
34	St. Lucie fine sand, 0 to 2 percent slopes	49.7	3.2%
38	Udorthents, shaped	161.4	10.3%
39	Udorthents-Urban land complex	27.1	1.7%
40	Urban land	196.4	12.6%
99	Water	12.8	0.8%
Totals for Area of Interest		**1,560.0**	**100.0%**

WATER TABLE MAP

Average Wet Season



Broward County Office of Environmental Services Water Management Division

February 17, 2000

averagewet.apr

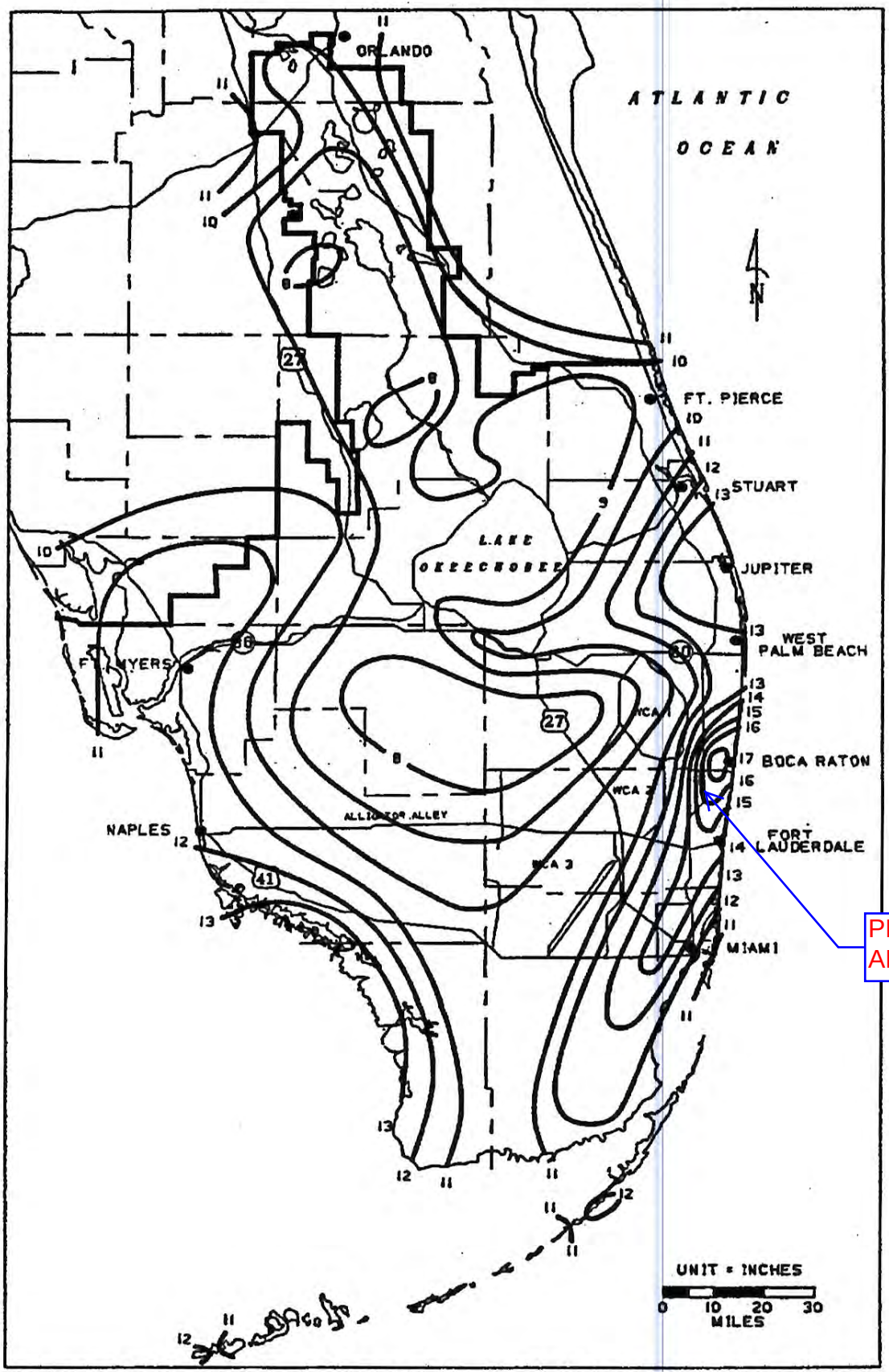


FIGURE C-8. 3-DAY RAINFALL: 25-YEAR RETURN PERIOD

Figure C-8

ance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

0 250 500 750 1,000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0367H

FIRM

FLOOD INSURANCE RATE MAP

BROWARD COUNTY, FLORIDA

AND INCORPORATED AREAS

PANEL 367 OF 751

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FORT LAUDERDALE, CITY OF	125105	0367	H
LAZY LAKE, VILLAGE OF	120045	0367	H
OAKLAND PARK, CITY OF	120050	0367	H
WILTON MANORS, CITY OF	125156	0367	H

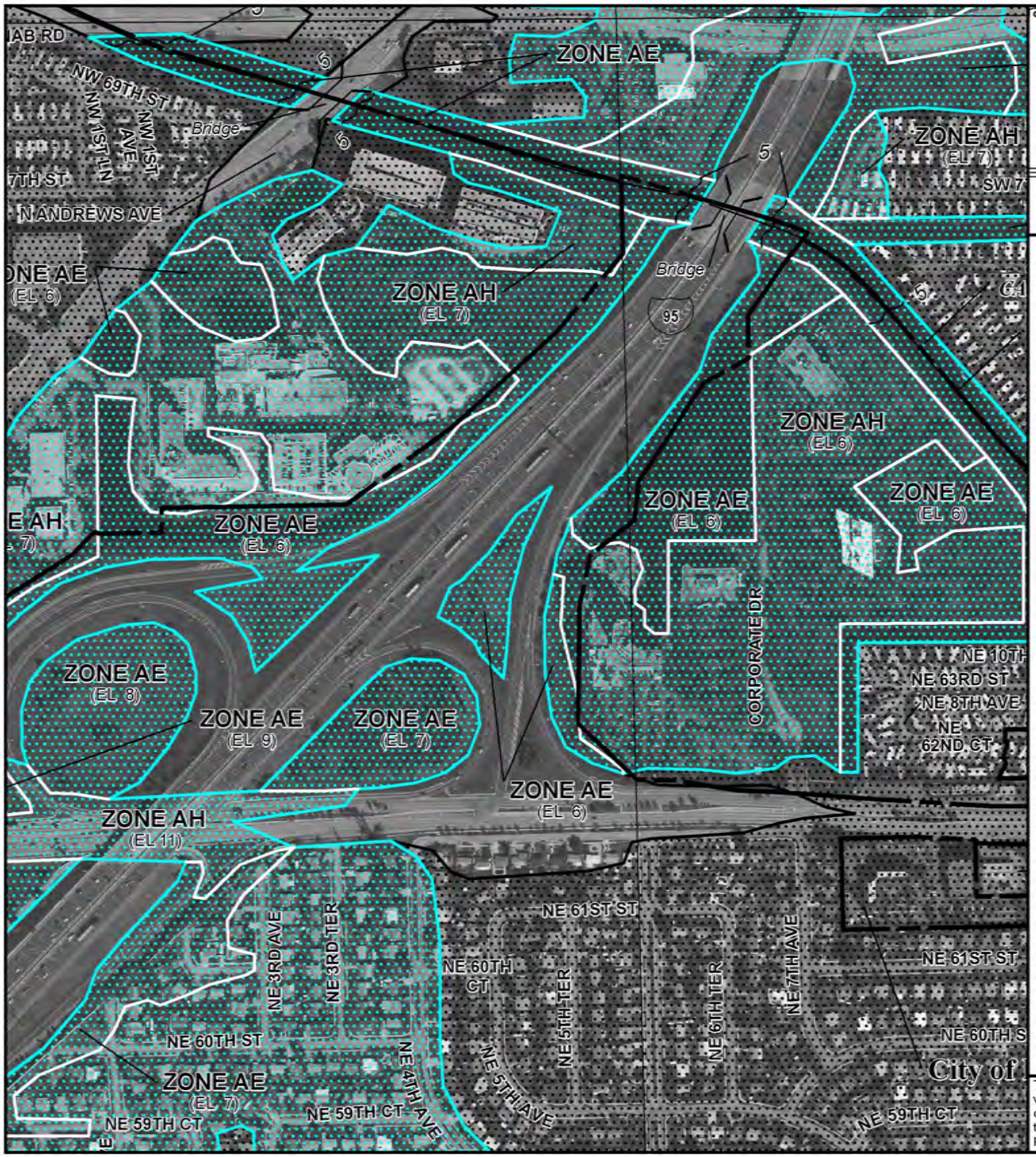
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
12011C0367H

EFFECTIVE DATE
AUGUST 18, 2014

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



ance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

0 250 500 750 1,000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0359H

FIRM

FLOOD INSURANCE RATE MAP

BROWARD COUNTY, FLORIDA

AND INCORPORATED AREAS

PANEL 359 OF 751

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BROWARD COUNTY	125093	0359	H
FORT LAUDERDALE, CITY OF	125105	0359	H
OAKLAND PARK, CITY OF	120050	0359	H
POMPANO BEACH, CITY OF	120055	0359	H

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MAP NUMBER
12011C0359H

EFFECTIVE DATE
AUGUST 18, 2014

Federal Emergency Management Agency

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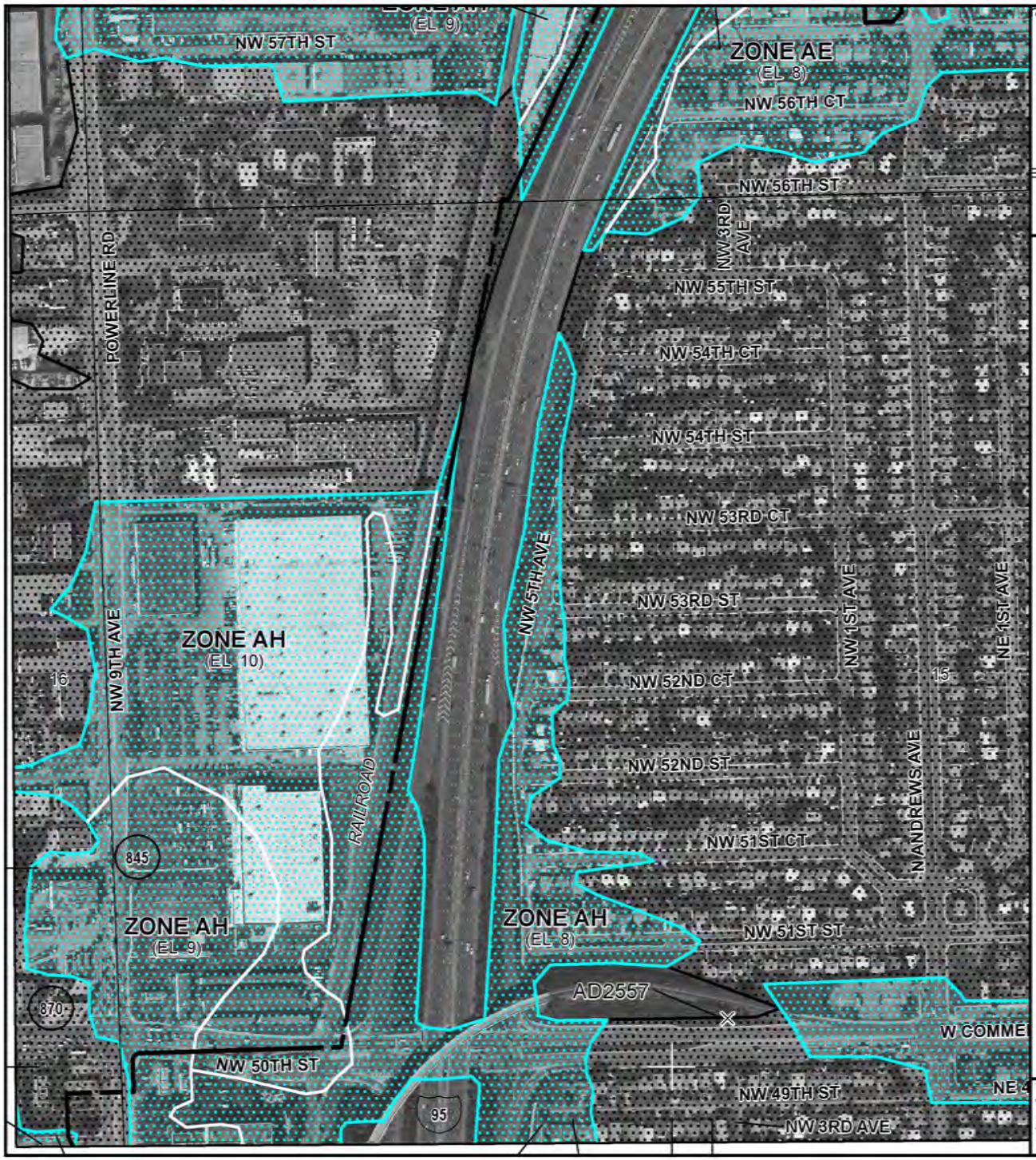

ance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

0 250 500 750 1,000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0359H

FIRM

FLOOD INSURANCE RATE MAP

BROWARD COUNTY, FLORIDA

AND INCORPORATED AREAS

PANEL 359 OF 751

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

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OAKLAND PARK, CITY OF	120050	0359	H
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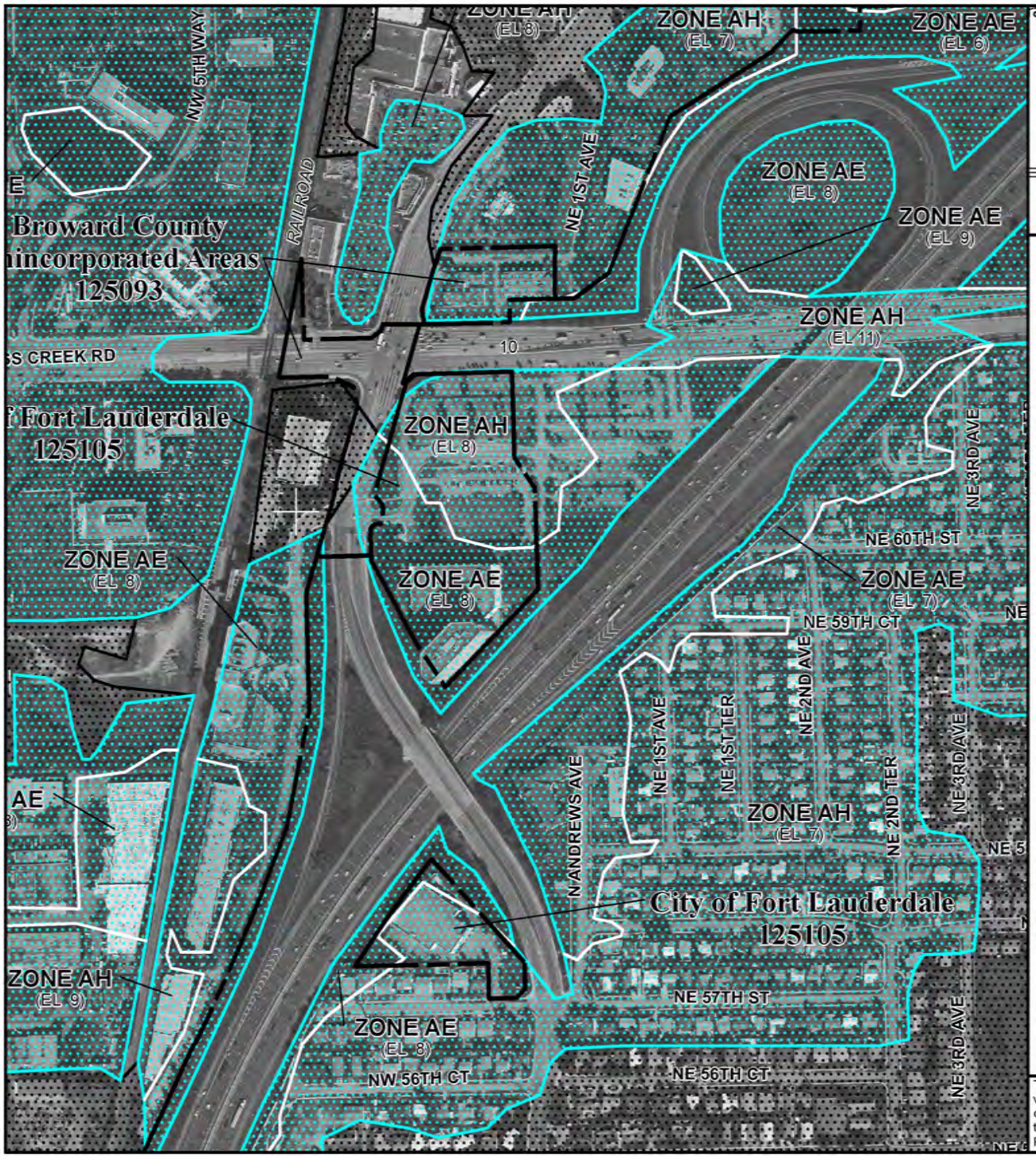

ance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

0 250 500 750 1,000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0359H

FIRM

FLOOD INSURANCE RATE MAP

BROWARD COUNTY, FLORIDA

AND INCORPORATED AREAS

PANEL 359 OF 751

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

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12011C0359H

EFFECTIVE DATE
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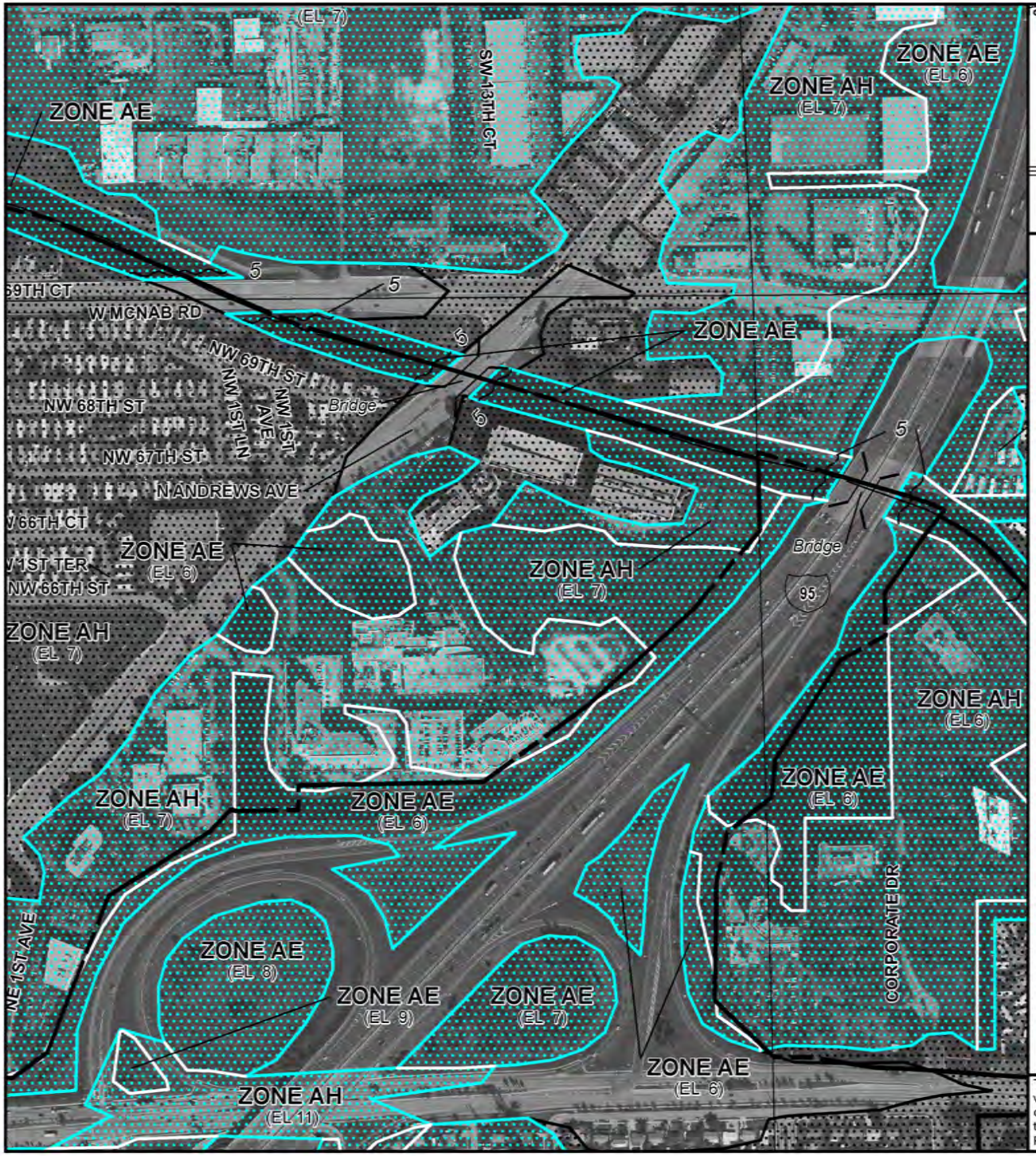

ance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

0 250 500 750 1,000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0359H

FIRM

FLOOD INSURANCE RATE MAP

BROWARD COUNTY, FLORIDA

AND INCORPORATED AREAS

PANEL 359 OF 751

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

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DRAFT FINAL LOCATION HYDRAULICS MEMORANDUM

Florida Department of Transportation

District Four

I-95 Commercial to Cypress Project Development and Environment (PD&E) Study

Limits of Project: SR 9/I-95 from South of SR 870/Commercial Boulevard to North of Cypress Creek Road

Broward County, Florida

Financial Management Number: 435808-1-22-02

ETDM Number: 14222

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 14, 2016 and executed by FHWA and FDOT.

Authorized Signature

Tomas Alfonso Ruiz, PE, CFM, LEED AP
Print/Type Name

Senior Drainage Engineer
Title

12895 SW 132nd St, Suite 100
Address

Miami, FL 33186
Address

Seal

Date: September 22, 2017

To: Mr. Nadir Rodrigues, PE, CPM, FDOT Project Manager

From: Mr. Tomas Ruiz, PE, CFM, LEED AP, Snubbs Drainage Engineer

Reference: **Draft Final Location Hydraulics Memorandum**
SR 9/I-95 South of SR 870/Commercial Boulevard to North of Cypress Creek Road
Broward County, Florida
FM#: 435808-1-22-02
EDTM#: 14222

Attachment: A – FEMA FIRM Maps

CC: Ms. Silvia Beltre, PE, Consultant Project Manager

PURPOSE

The purpose of this memorandum is to address the 100-year (base) floodplain encroachments resulting from the roadway improvements evaluated in the Project Development and Environment (PD&E) study for SR-9/I-95 From South Of SR-870/Commercial Boulevard Interchange to North of Cypress Creek Road. In accordance with Executive Order 11988m "Floodplain Management", USDOT Order 5650.2, "Floodplain Management Protection", and Federal-Aid Policy Guide 23 CFR 650A, floodplains must be protected. The intent of these regulations is to avoid or minimize highway encroachments within the base floodplains, and to avoid supporting land use development incompatible with floodplain values.

BASE FLOODPLAIN

The Federal Emergency Management Agency (FEMA) website was reviewed to find the latest Flood Insurance Rate Maps (FIRM) for the project area in Broward County. FIRM Community Panel Numbers 12011C0359H and 12011C0367H, dated August 18, 2014, indicates that a portion of the project area is located in the 100-year floodplain. See **Attachment A** for FEMA FIRM and **Figure 1** for FEMA flood zones within the project limits.

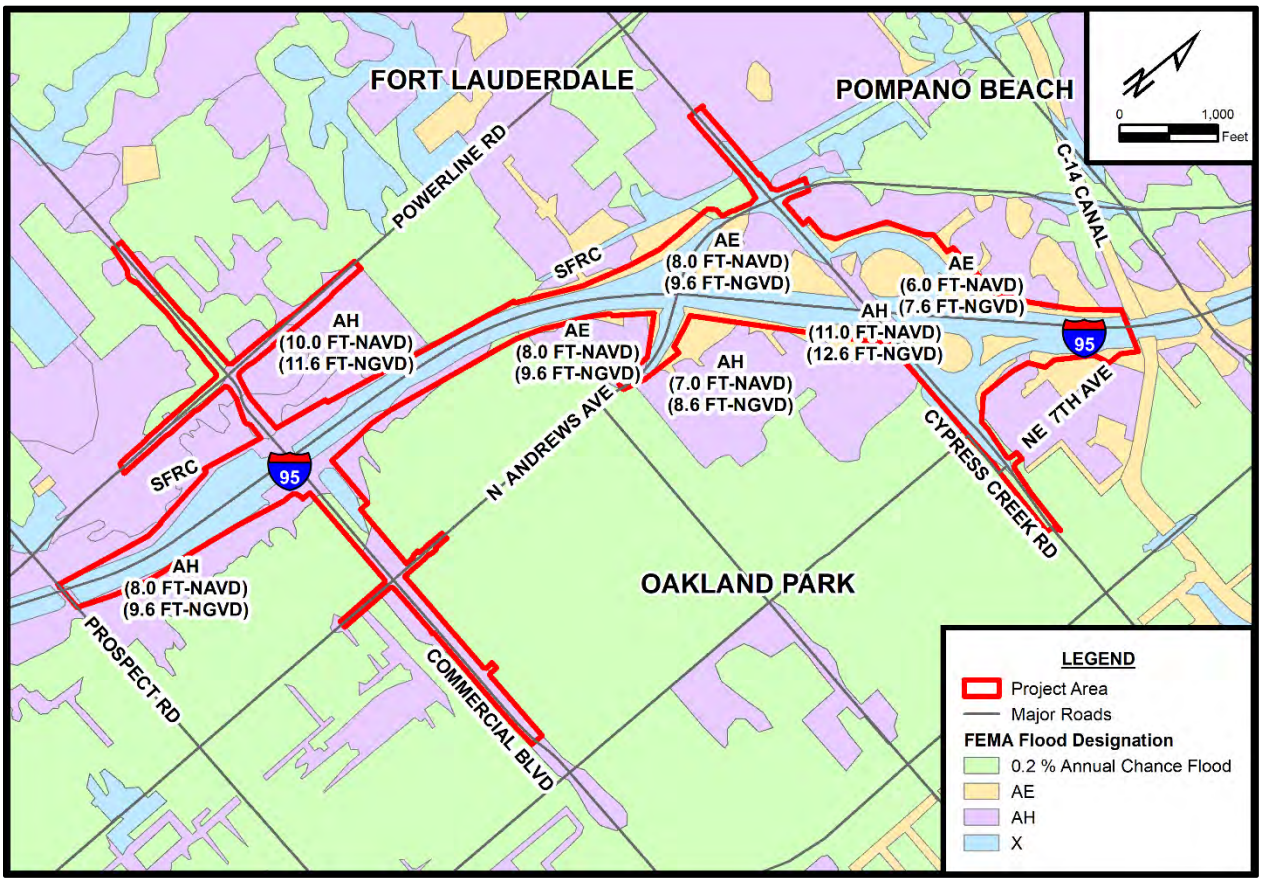


Figure 1: FEMA Flood Zones

A review of the Flood Insurance Rate Map published by Federal Emergency Management Agency (FEMA), indicates that a portion of the study area is located in Special Flood Zones AE, AH and X. Areas identified in zone AE have a 1% annual chance of flooding during the Base Flood (100-year flood) with base elevations ranging from 6.0-ft. to 9.0-ft. NAVD (7.6-ft. to 10.6-ft. NGVD) within the project area. Areas identified in zone AH have a 1% annual chance of flooding during the Base Flood (100-year flood) with base elevations ranging from 7.0-ft. to 11.0-ft. NAVD (8.6-ft. to 12.6-ft. NGVD) and flood depths ranging from 1 to 3 feet. Areas identified in zone X are estimated to have less than 1 foot or no flooding at all during the Base Flood. **Table 1** below provides a summary of the flood zone, base elevation and recommended minimum elevations for various locations in the study area.

Table 1: Floodplain Summary

System Name	Road Section Description	Flood Zone	Base El. (ft-NGVD)	Base El. (ft-NAVD)	Existing El.[1] (ft-NAVD)	Propose Roadway Recommendation
C13-SCOM	Prospect Rd to W Commercial Blvd	AH, X	9.6	8.0	9.0 to 44.0	Maintain min 9.0-ft. for ramps and 10.0-ft. for I-95 mainline
C13-NCOM	Commercial Blvd to NW 55th St	AH, X	8.6 to 11.6	7.0 to 10.0	8.0 to 30.0	Maintain min 8.0-ft. for ramps and 10.0-ft. for I-95 mainline
C14-SCYP	Cypress Creek Rd to NW 55th St	AE, AH, X	8.6 to 12.6	7.0 to 11.0	9.0 to 33.0	Maintain min 9.0-ft. for ramps and 10.0-ft. for I-95 mainline
C14-NCYP	Cypress Creek Rd to C-14 Canal	AE, AH, X	7.6 to 12.6	6.0 to 11.0	7.0 to 31.0	Maintain min 7.0-ft. for ramps and 9.0-ft. for I-95 mainline

[1]Existing elevations were obtained from the roadway cross sections in the permit plans, SFWMD Permit 06-01465-S, Application 140516-1.

All elevations are based on the NAVD88 datum. To convert to NGVD29 datum, a shift of +1.585 feet is needed, as found by using the National Geodetic Survey VERTCON online tool. The proposed roadway edge of pavement will vary within the project area. To ensure that the roadway remains open to traffic during the 100-year flood, minimum elevations were proposed in **Table 1** above.

No adverse impacts are anticipated to the floodplain, as required by the SFWMD permitting requirements. Encroachments due to the proposed roadway improvements are being compensated within the proposed stormwater management system, mostly through the use of dry and wet-detention, and dry-retention ponds.

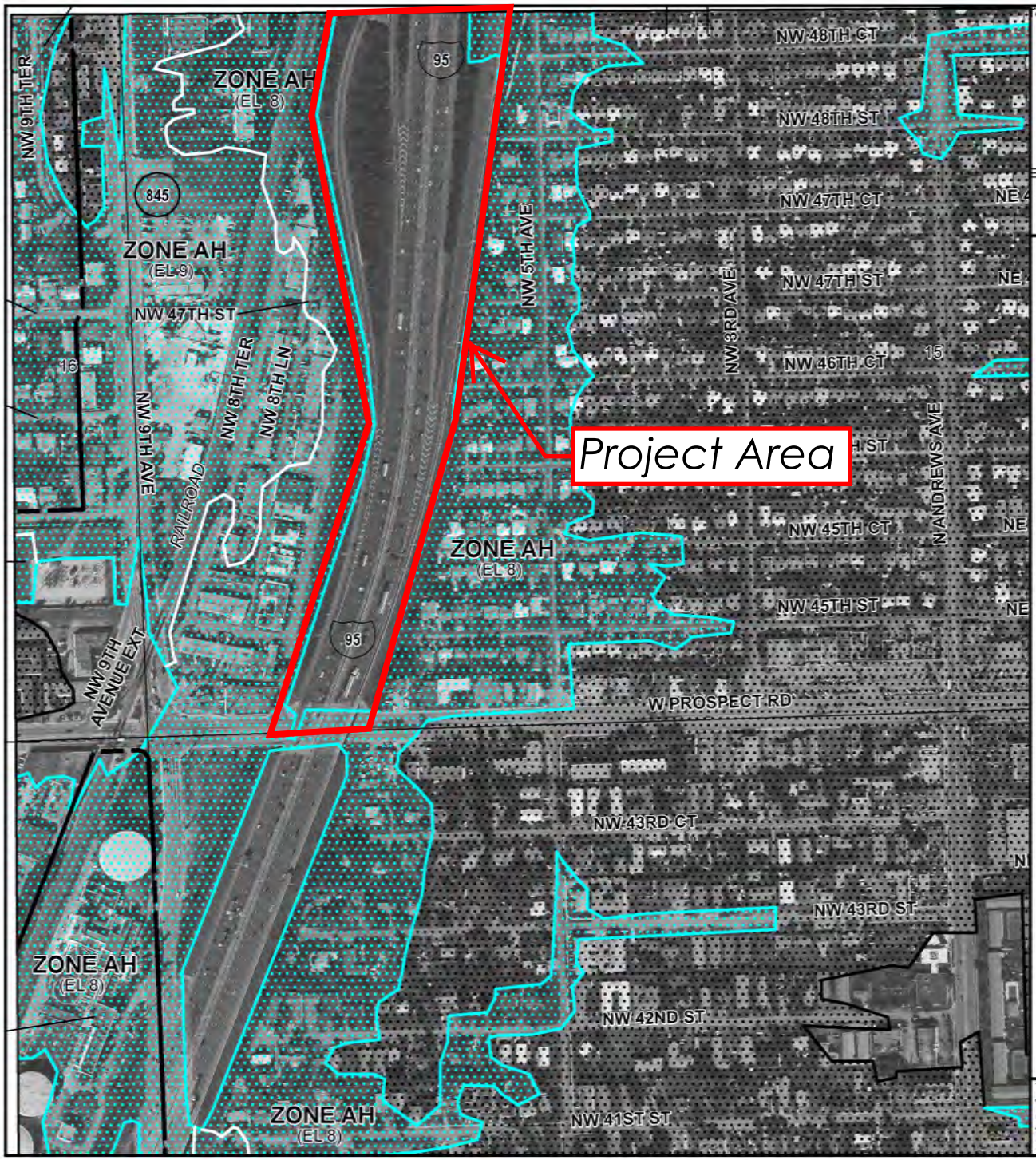
WATER QUALITY

Stormwater management systems proposed by this study meet existing water quality standards set forth in Chapter 62-302 of the Florida Administrative Code. This project will avoid causing adverse impacts to off-site properties by limiting the post-development offsite discharge so that it does not exceed pre-development rates. The approach to meeting water quality requirements is to provide treatment for the increase in impervious area and restore or replace existing permitted treatment facilities impacted by this project.

RISK ASSESSMENT

There is no change in flood "Risk" or adverse floodplain impacts associated with this project. The following floodplain statement is a slightly modified version of statement number 3, in Chapter 13 of the PD&E Manual, tailored for this project.

Modifications to existing drainage structures included in this project will result in an insignificant change in their capacity to carry floodwater. This change will cause minimal increases in flood heights and flood limits. These minimal increases will not result in any significant adverse impacts on the natural and beneficial floodplain values or any significant change in flood risks or damage. In addition, this project will not result in any new or increased adverse environmental impacts. There will not be a significant change in the potential for interruption or termination of emergency service or emergency evacuation routes. Therefore, it has been determined that this encroachment is not significant.



ance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

0 250 500 750 1,000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0367H

FIRM

FLOOD INSURANCE RATE MAP

BROWARD COUNTY, FLORIDA

AND INCORPORATED AREAS

PANEL 367 OF 751

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FORT LAUDERDALE, CITY OF	125105	0367	H
LAZY LAKE, VILLAGE OF	120045	0367	H
OAKLAND PARK, CITY OF	120050	0367	H
WILTON MANORS, CITY OF	125156	0367	H

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MAP NUMBER
12011C0367H

EFFECTIVE DATE
AUGUST 18, 2014

Federal Emergency Management Agency

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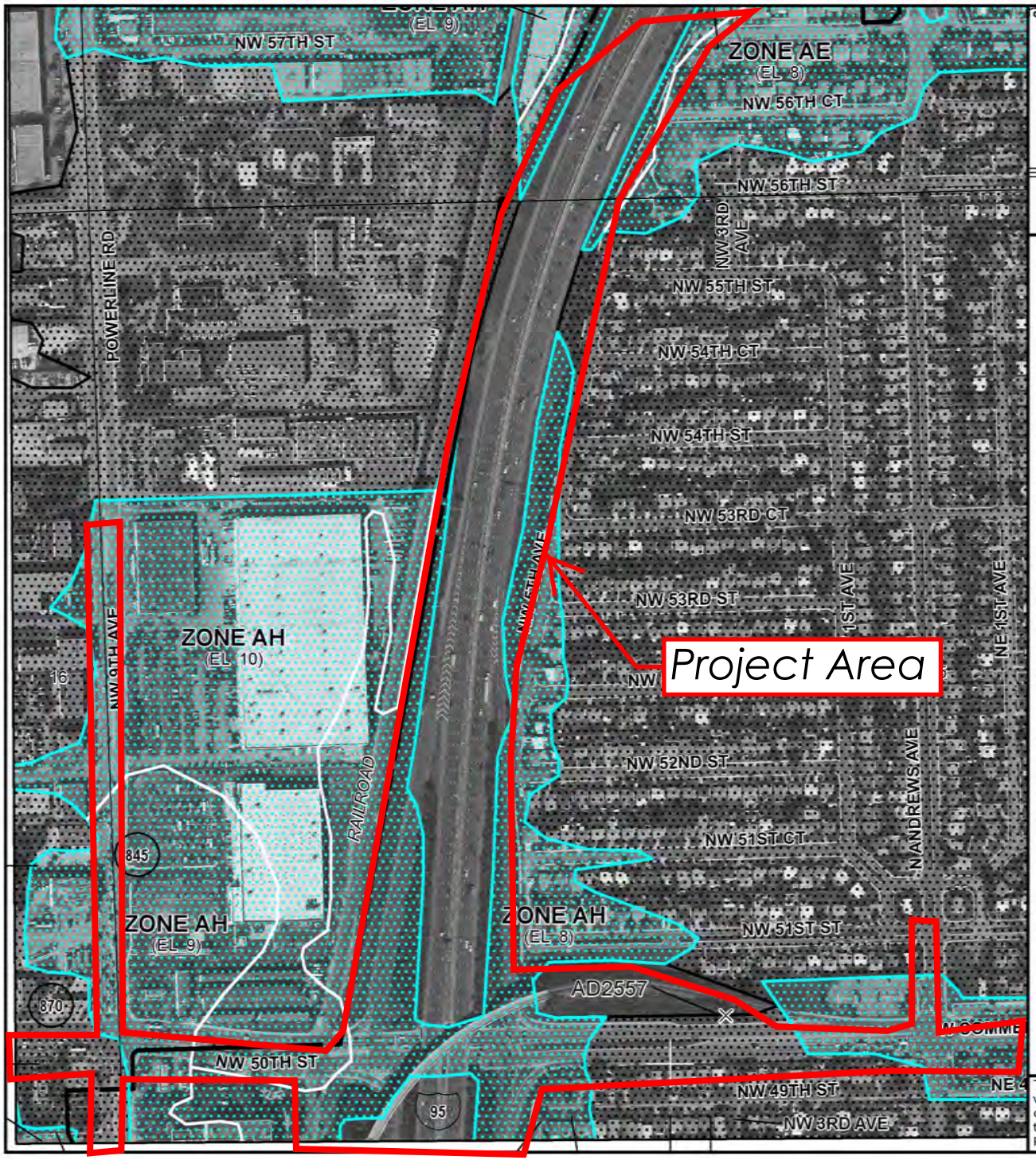


ance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

0 250 500 750 1,000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0359H

FIRM

FLOOD INSURANCE RATE MAP

BROWARD COUNTY, FLORIDA

AND INCORPORATED AREAS

PANEL 359 OF 751

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BROWARD COUNTY	125093	0359	H
FORT LAUDERDALE, CITY OF	125105	0359	H
OAKLAND PARK, CITY OF	120050	0359	H
POMPANO BEACH, CITY OF	120055	0359	H

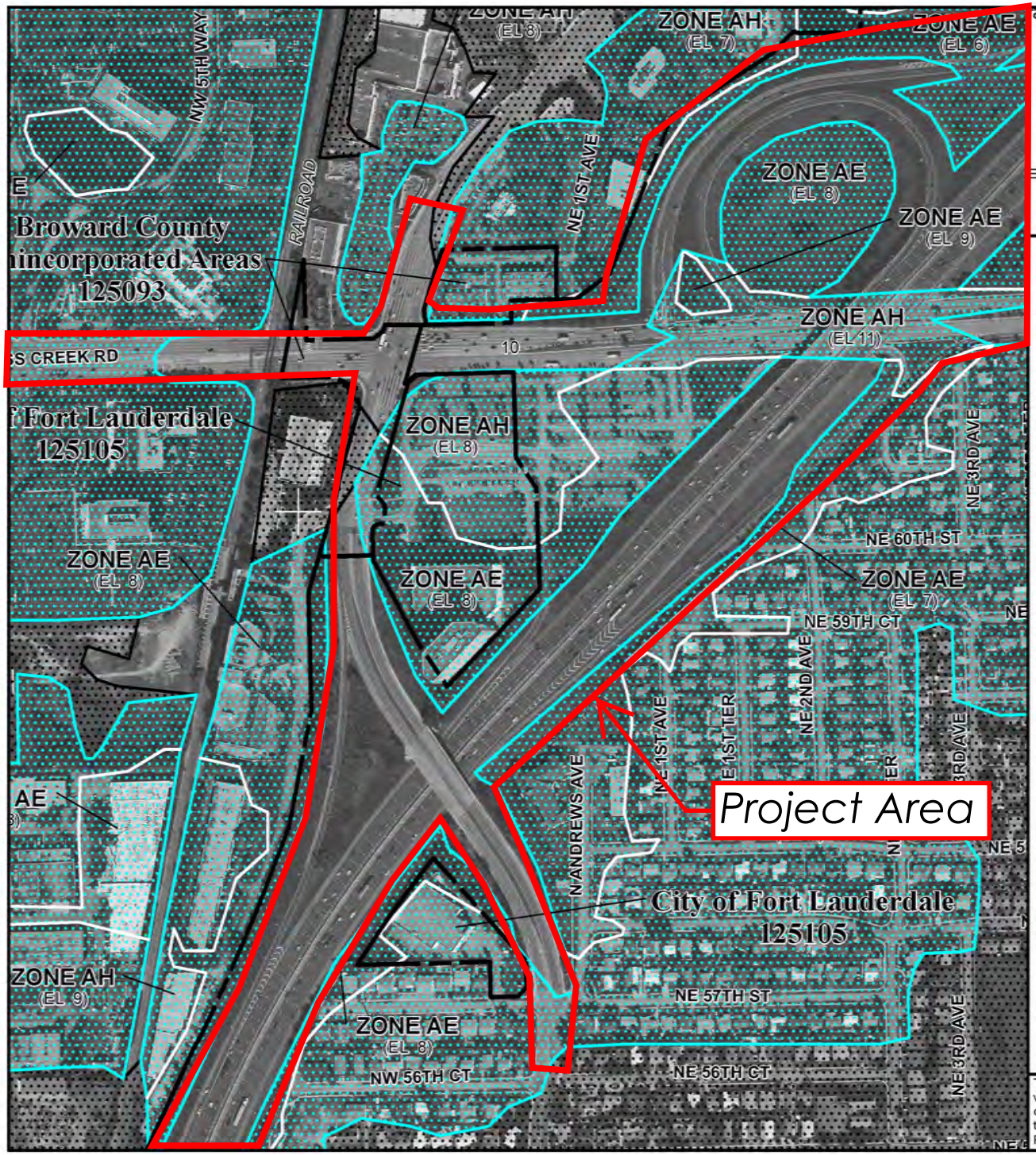
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
12011C0359H

EFFECTIVE DATE
AUGUST 18, 2014

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



ance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

0 250 500 750 1,000 FEET

NFIP

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FLOOD INSURANCE RATE MAP

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PANEL 359 OF 751

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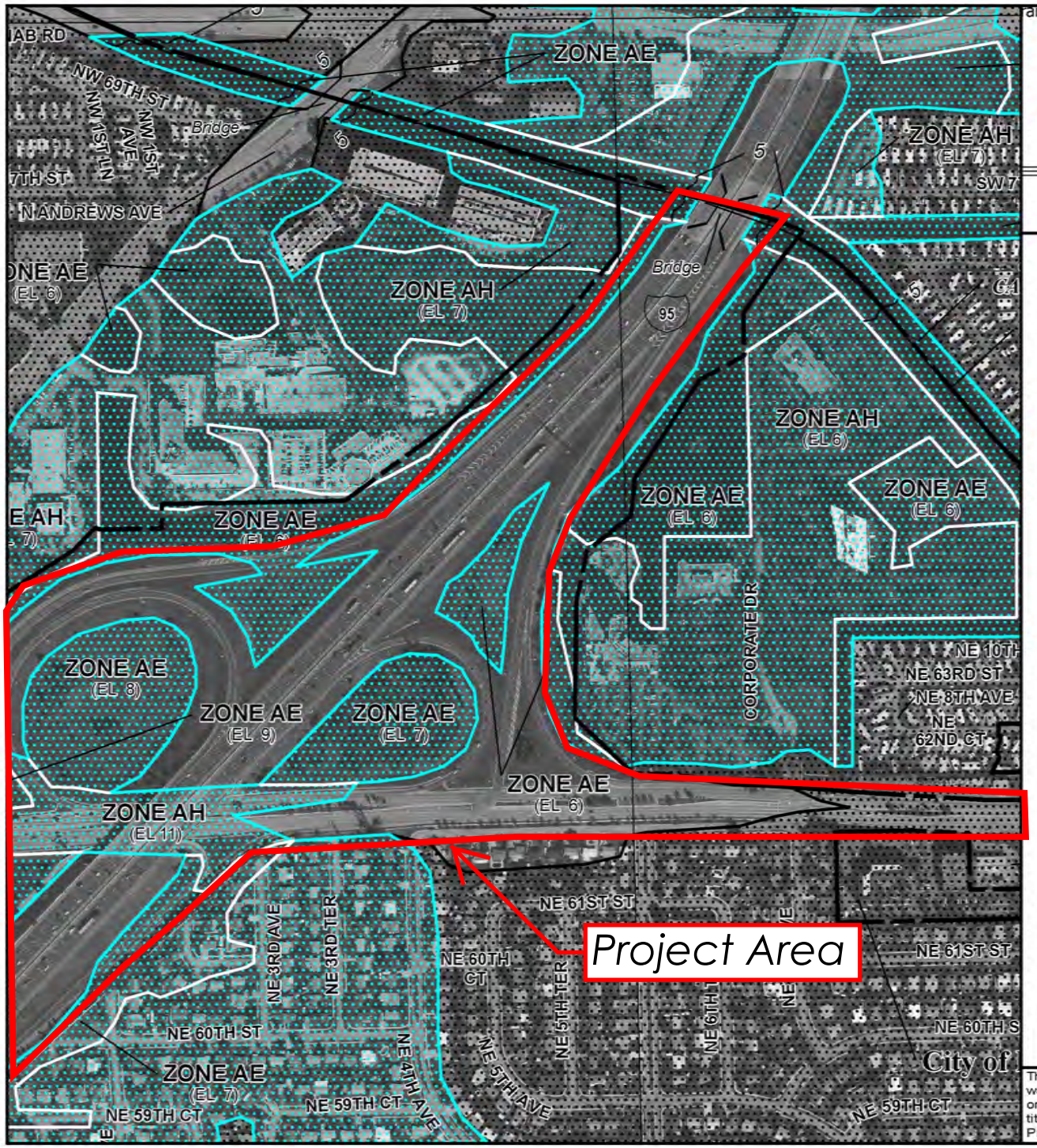

ance Program at 1-800-638-6620.

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0 250 500 750 1,000 FEET

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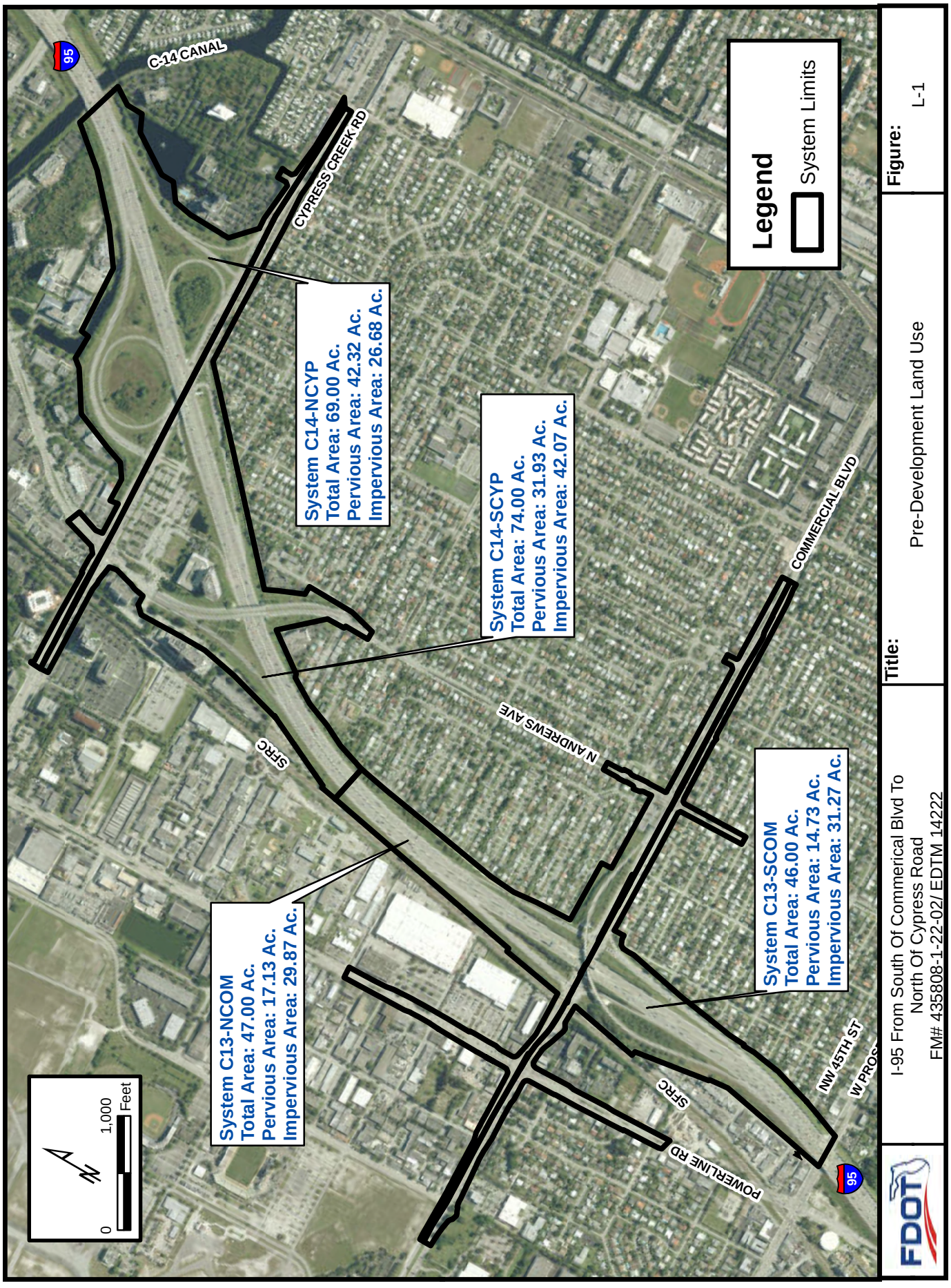
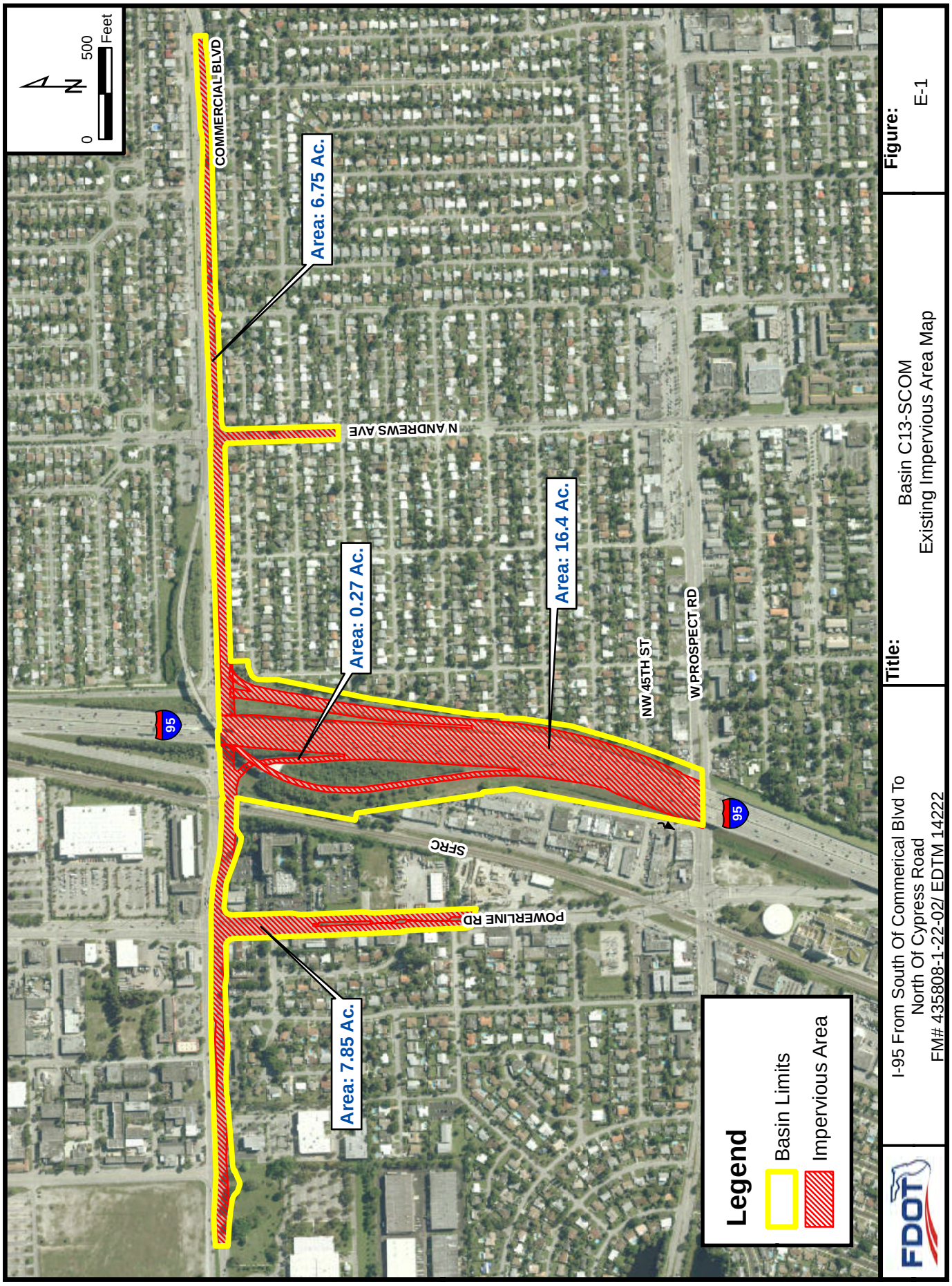
APPENDIX B

(Calculations)

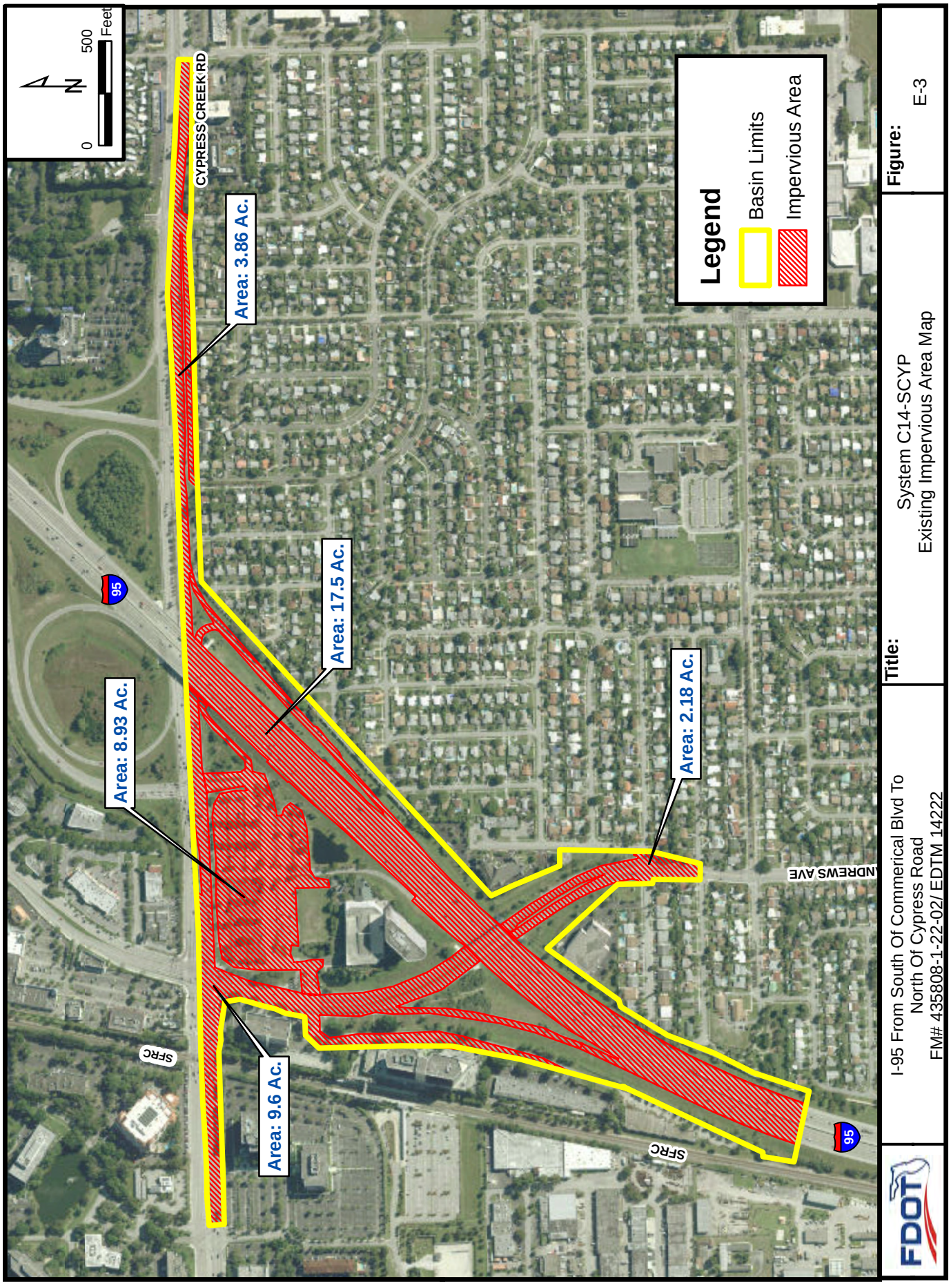
B1-17: Drainage Areas

B18-32: Preliminary Treatment Calculations

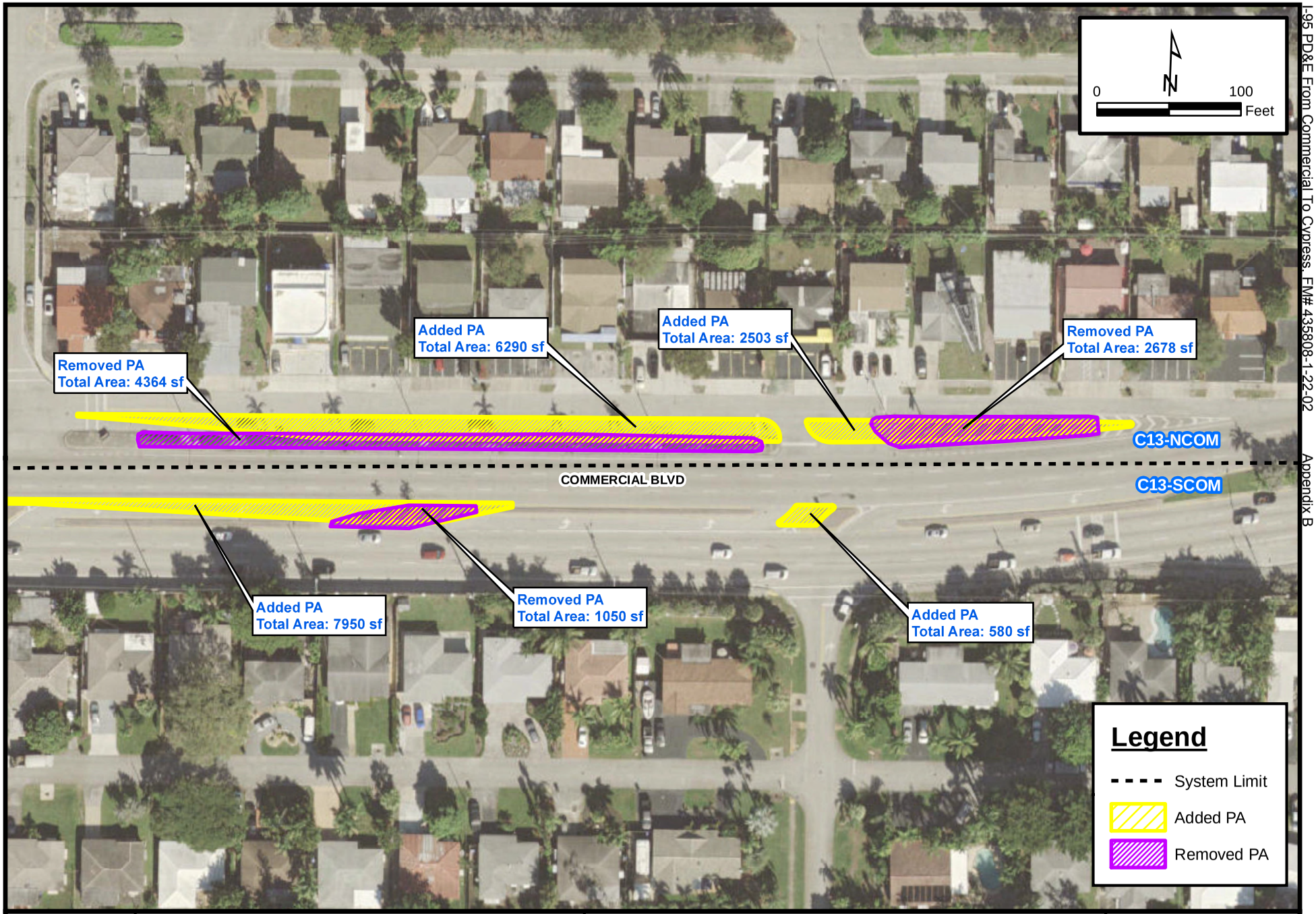

C-14 CANAL
CYPRESS CREEK RD
System C14-NCYP
Total Area: 69.00 Ac.
Pervious Area: 42.32 Ac.
Impervious Area: 26.68 Ac.
System C14-SCYP
Total Area: 74.00 Ac.
Pervious Area: 31.93 Ac.
Impervious Area: 42.07 Ac.
System C13-NCOM
Total Area: 47.00 Ac.
Pervious Area: 17.13 Ac.
Impervious Area: 29.87 Ac.
System C13-SCOM
Total Area: 46.00 Ac.
Pervious Area: 14.73 Ac.
Impervious Area: 31.27 Ac.
SFRC
N ANDREWS AVE
COMMERCIAL BLVD
POWERLINE RD
NW 45TH ST
W PROS
95
Legend
System Limits
0
1,000
Feet
FDOT
I-95 From South Of Commerical Blvd To
North Of Cypress Road
FM# 435808-1-22-02/ EDTM 14222
Title:
Pre-Development Land Use
Figure:
L-1


N
0
500
Feet
COMMERCIAL BLVD
Area: 6.75 Ac.
N ANDREWS AVE
Area: 0.27 Ac.
Area: 16.4 Ac.
NW 45TH ST
W PROSPECT RD
95
95
SFRC
POWERLINE RD
Area: 7.85 Ac.
Legend
Basin Limits
Impervious Area
FDOT
I-95 From South Of Commerical Blvd To
North Of Cypress Road
FM# 435808-1-22-02/ EDTM 14222
Title:
Basin C13-SCOM
Existing Impervious Area Map
Figure:
E-1

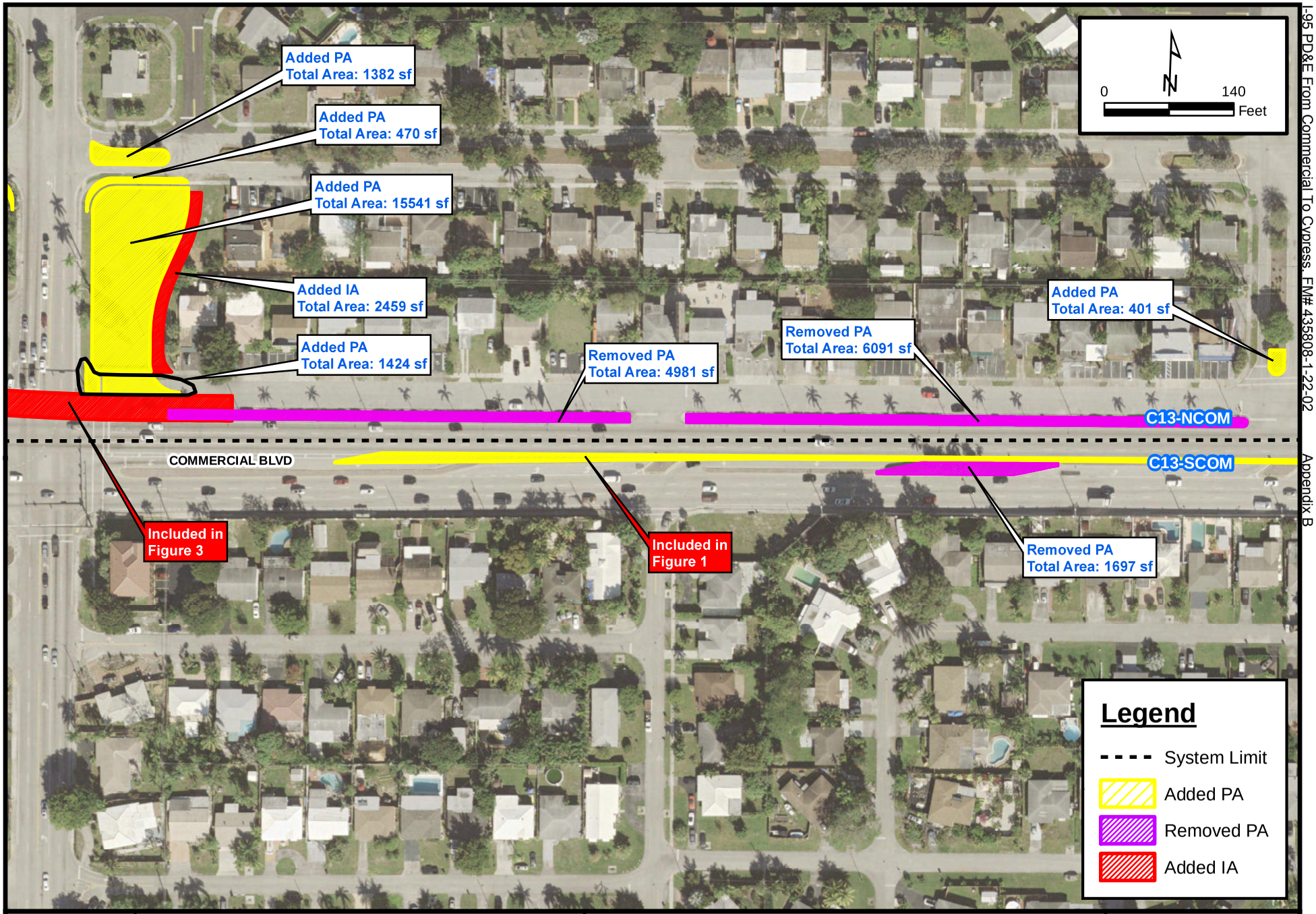
FDOT	I-95 From South Of Commerical Blvd To North Of Cypress Road FM# 435808-1-22-02/ EDTM 14222	**Title:** System C13-NCOM Existing Impervious Area Map	**Figure:** E-2


N
0
500
Feet
Legend
Basin Limits
Impervious Area
CYPRESS CREEK RD
Area: 3.86 Ac.
Area: 17.5 Ac.
Area: 8.93 Ac.
Area: 9.6 Ac.
Area: 2.18 Ac.
ANDREWS AVE
SFRC
SFRC
95
95
FDOT
I-95 From South Of Commerical Blvd To
North Of Cypress Road
FM# 435808-1-22-02/ EDTM 14222
Title:
System C14-SCYP
Existing Impervious Area Map
Figure:
E-3

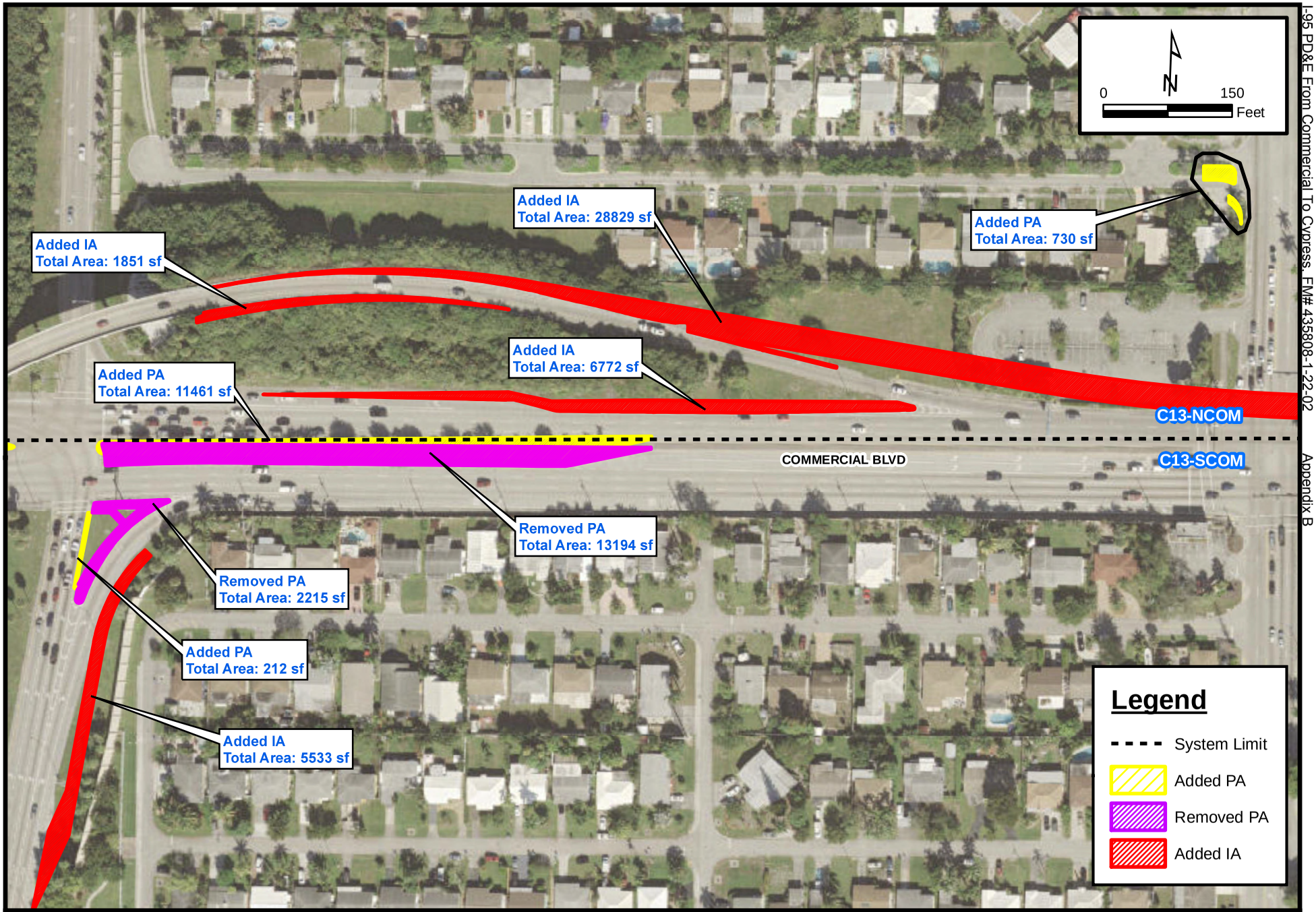
FDOT	I-95 From South Of Commerical Blvd To North Of Cypress Road FM# 435808-1-22-02/ EDTM 14222	**Title:** System C14-NCYP Existing Impervious Area Map	**Figure:** E-4



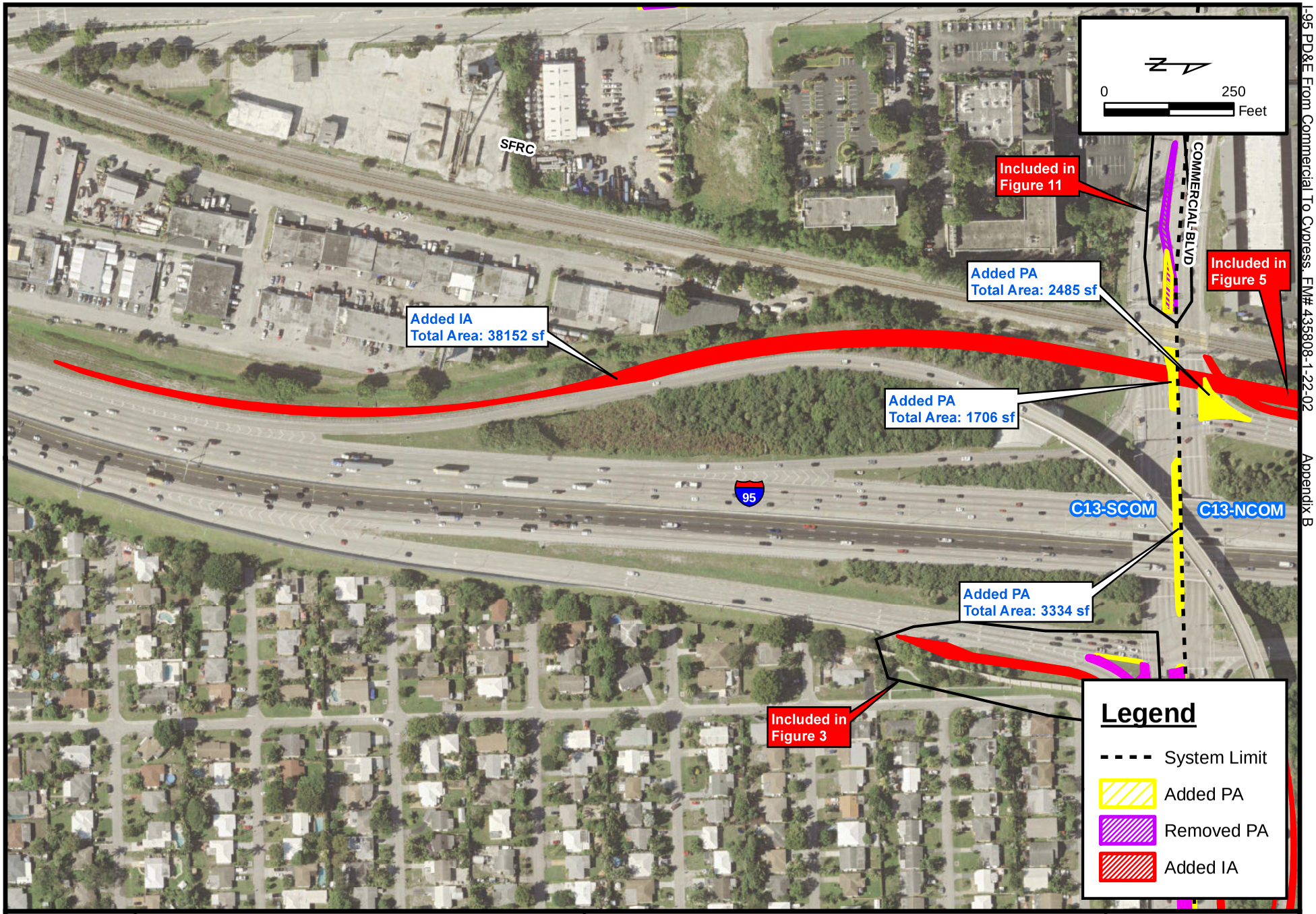
FDOT	I-95 From South Of Commerical Blvd To North Of Cypress Road FM# 435808-1-22-02/ EDTM 14222	**Title:** Andrews Flyover Impervious Area Map 1	**Figure:** 1



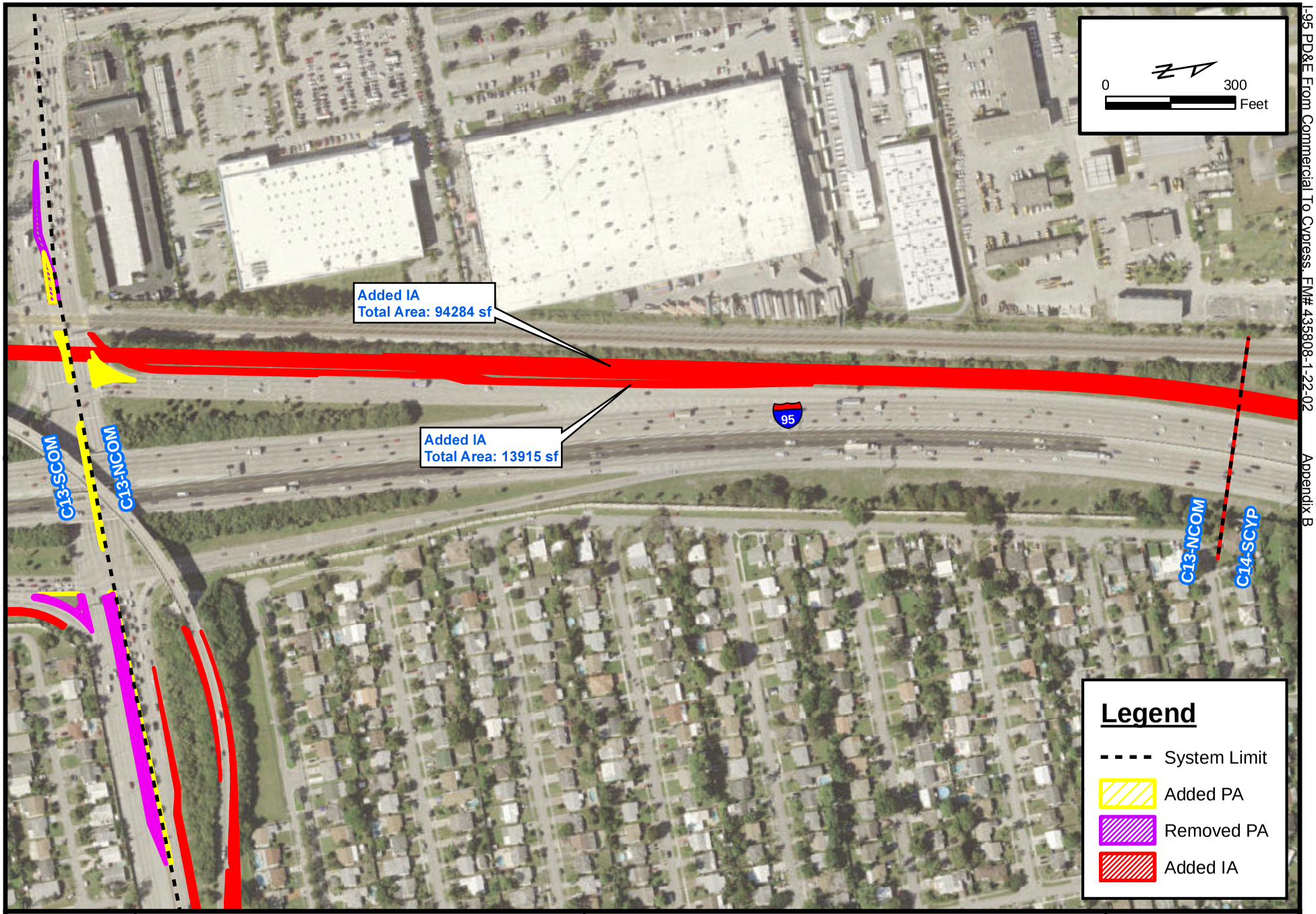
FDOT	I-95 From South Of Commerical Blvd To North Of Cypress Road FM# 435808-1-22-02/ EDTM 14222	**Title:** Andrews Flyover Impervious Area Map 2	**Figure:** 2



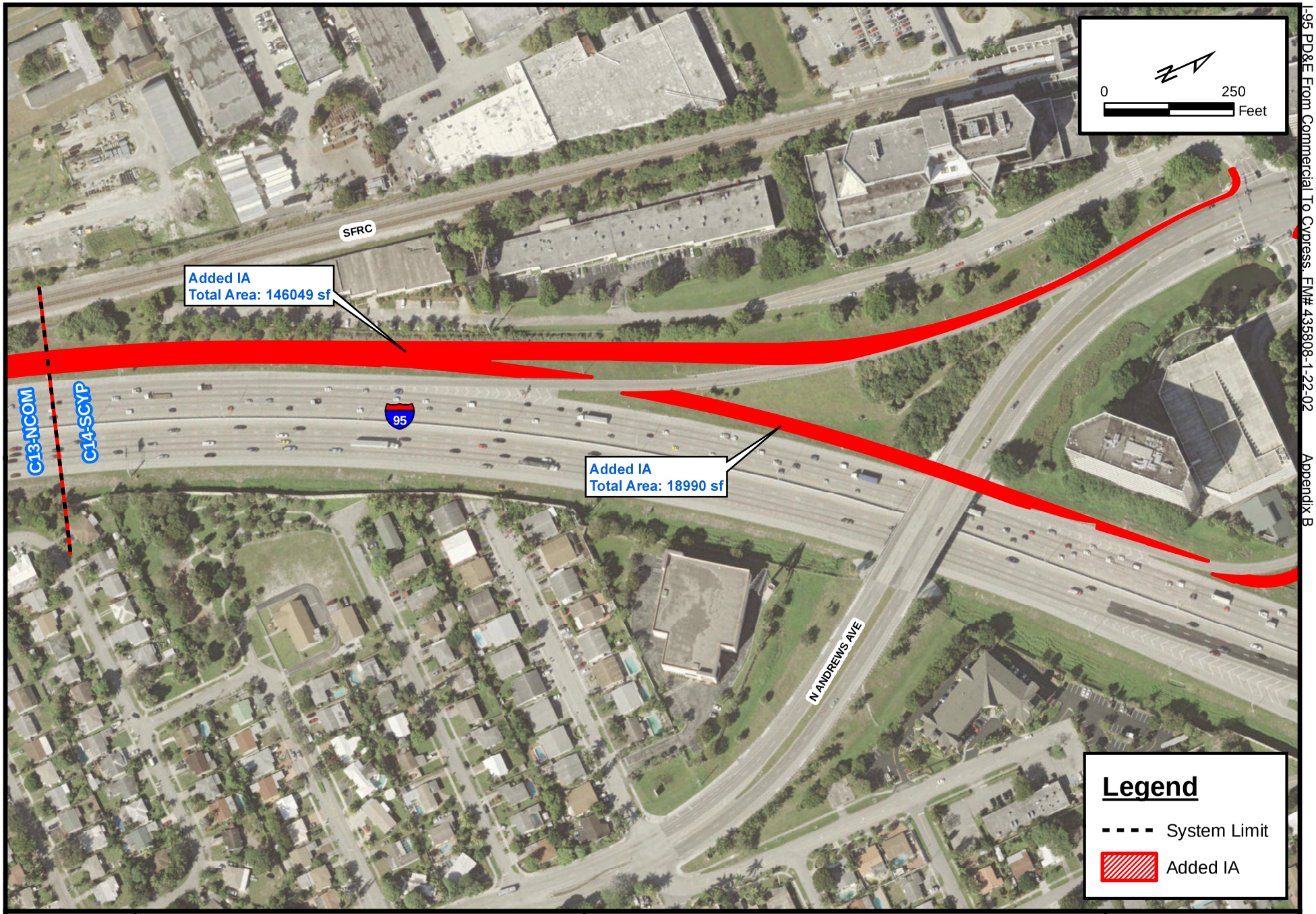
FDOT	I-95 From South Of Commerical Blvd To North Of Cypress Road FM# 435808-1-22-02/ EDTM 14222	**Title:** Andrews Flyover Impervious Area Map 3	**Figure:** 3



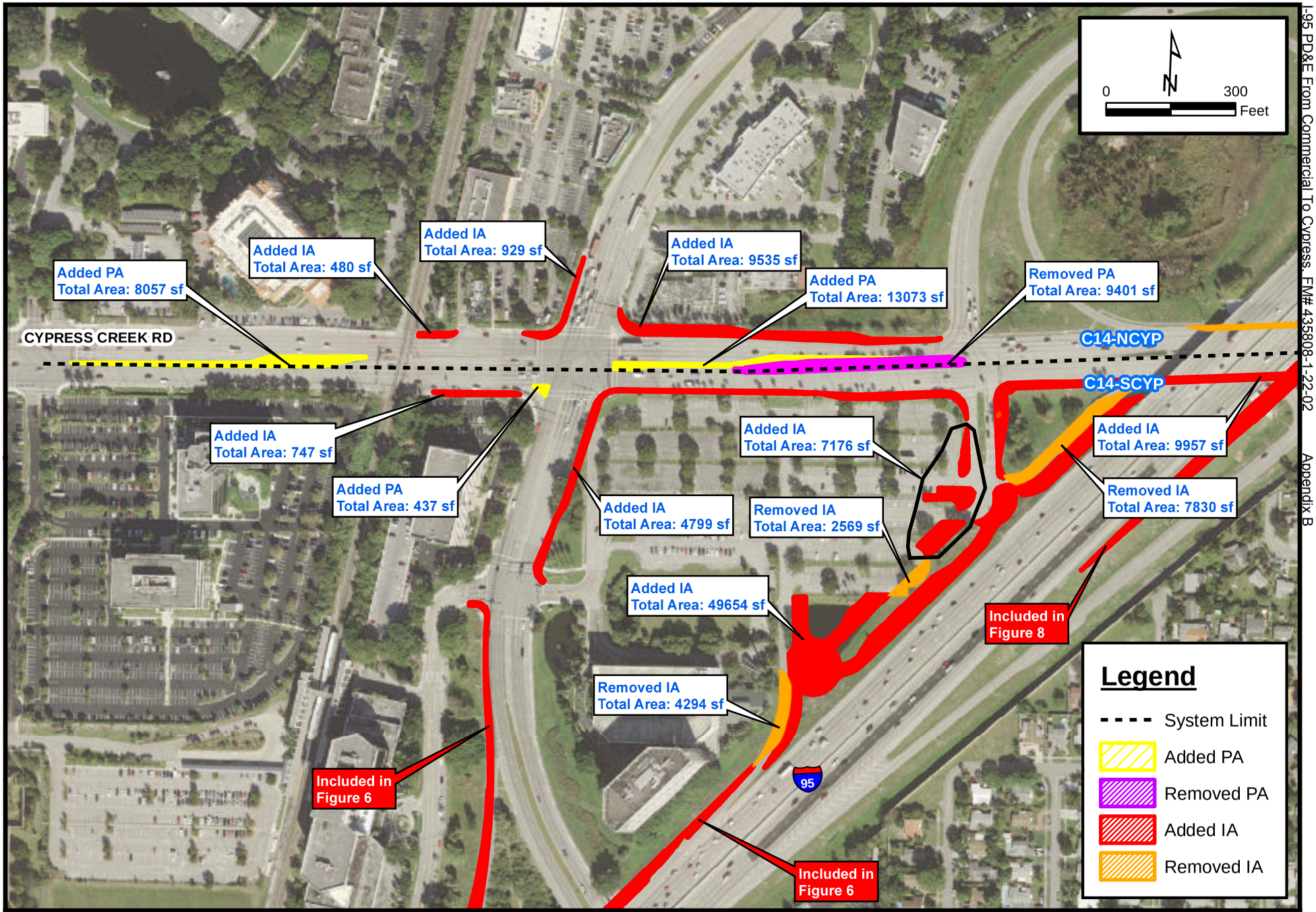
FDOT	I-95 From South Of Commerical Blvd To North Of Cypress Road FM# 435808-1-22-02/ EDTM 14222	**Title:** Andrews Flyover Impervious Area Map 4	**Figure:** 4



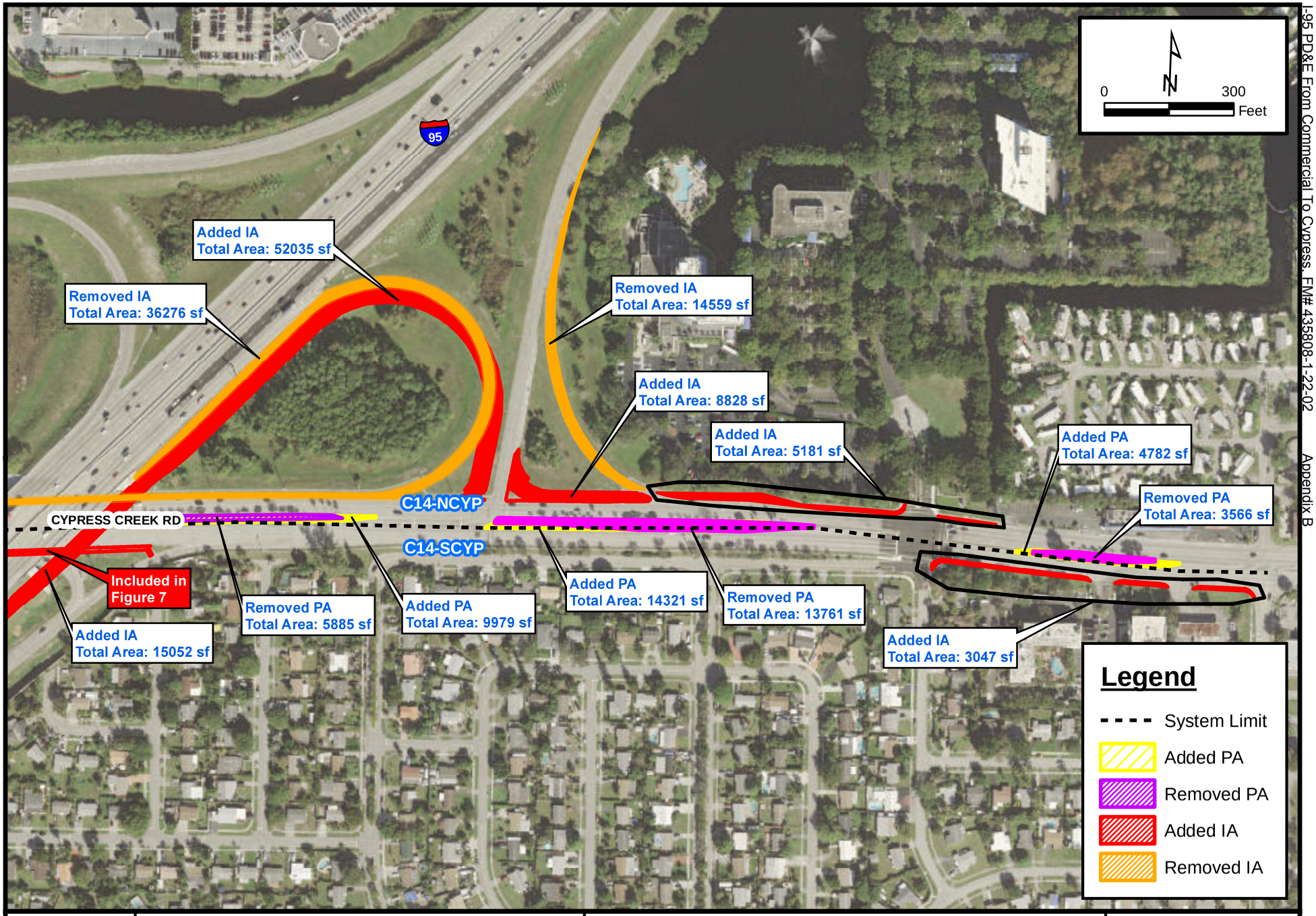
FDOT	I-95 From South Of Commerical Blvd To North Of Cypress Road FM# 435808-1-22-02/ EDTM 14222	**Title:** I-95 Mainline Impervious Area Map 1	**Figure:** 5



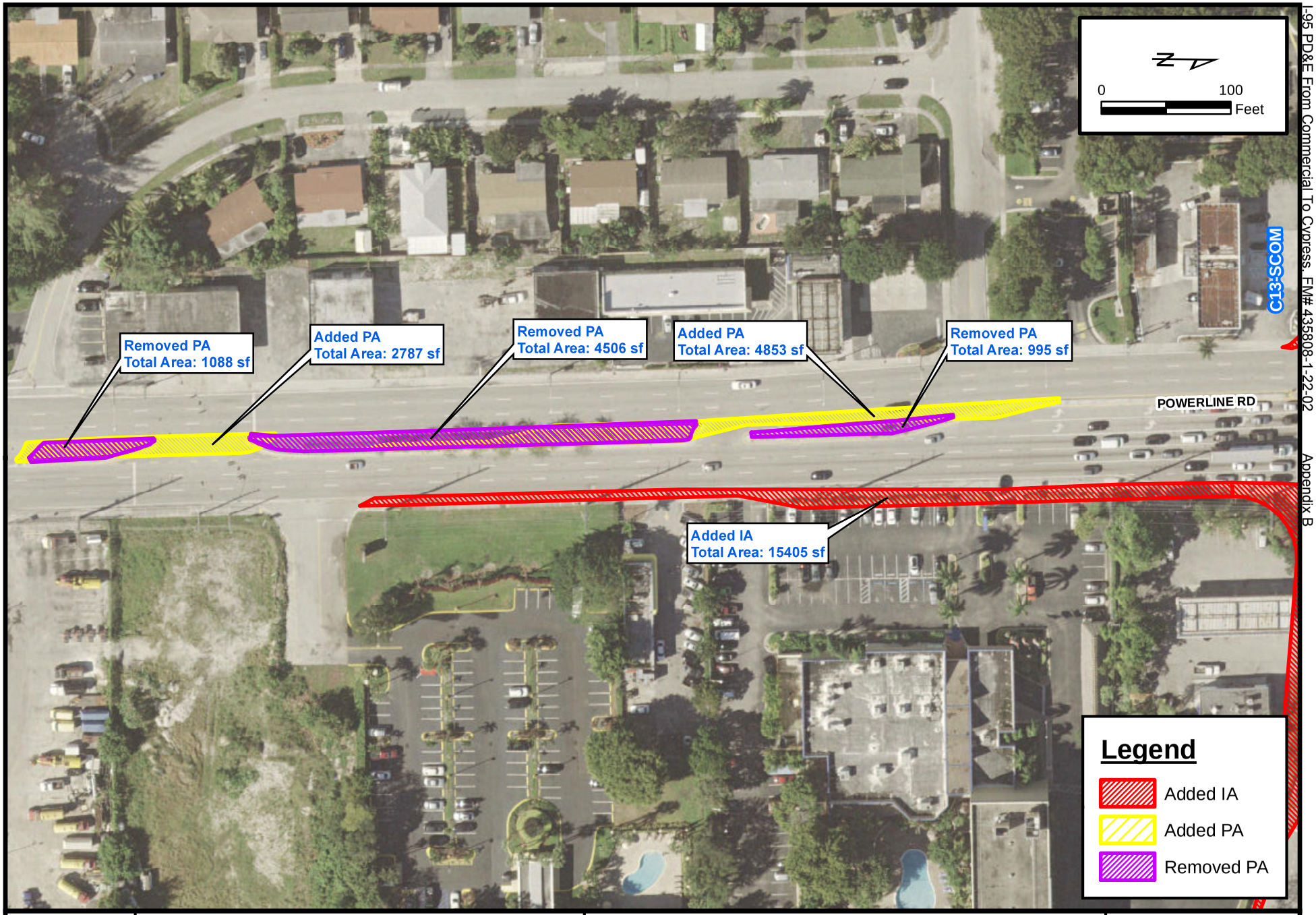
FDOT	I-95 From South Of Commerical Blvd To North Of Cypress Road FM# 435808-1-22-02/ EDTM 14222	**Title:** I-95 Mainline Impervious Area Map 2	**Figure:** 6



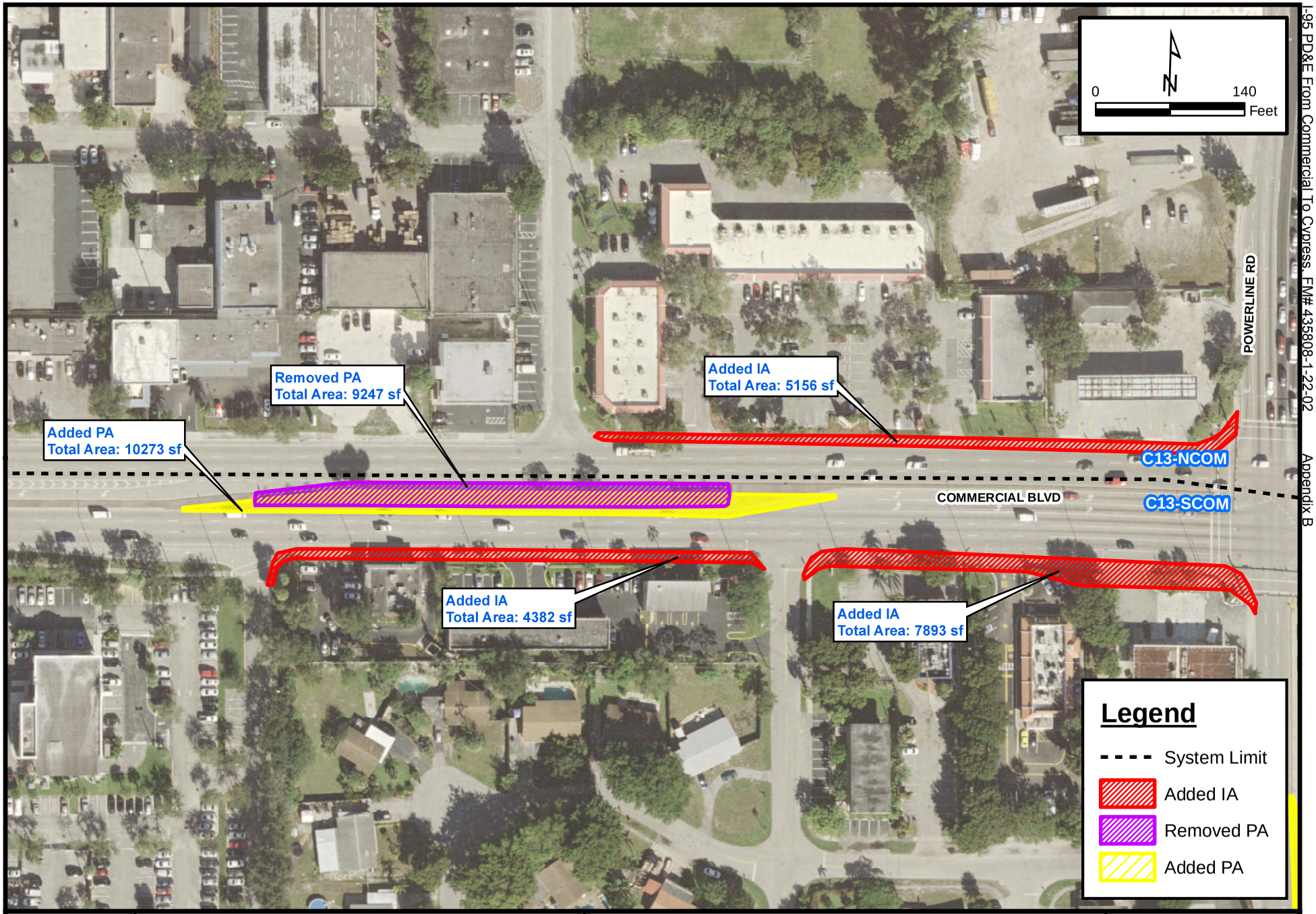
FDOT	I-95 From South Of Commerical Blvd To North Of Cypress Road FM# 435808-1-22-02/ EDTM 14222	**Title:** Cypress Option 1 Impervious Area Map 1	**Figure:** 7



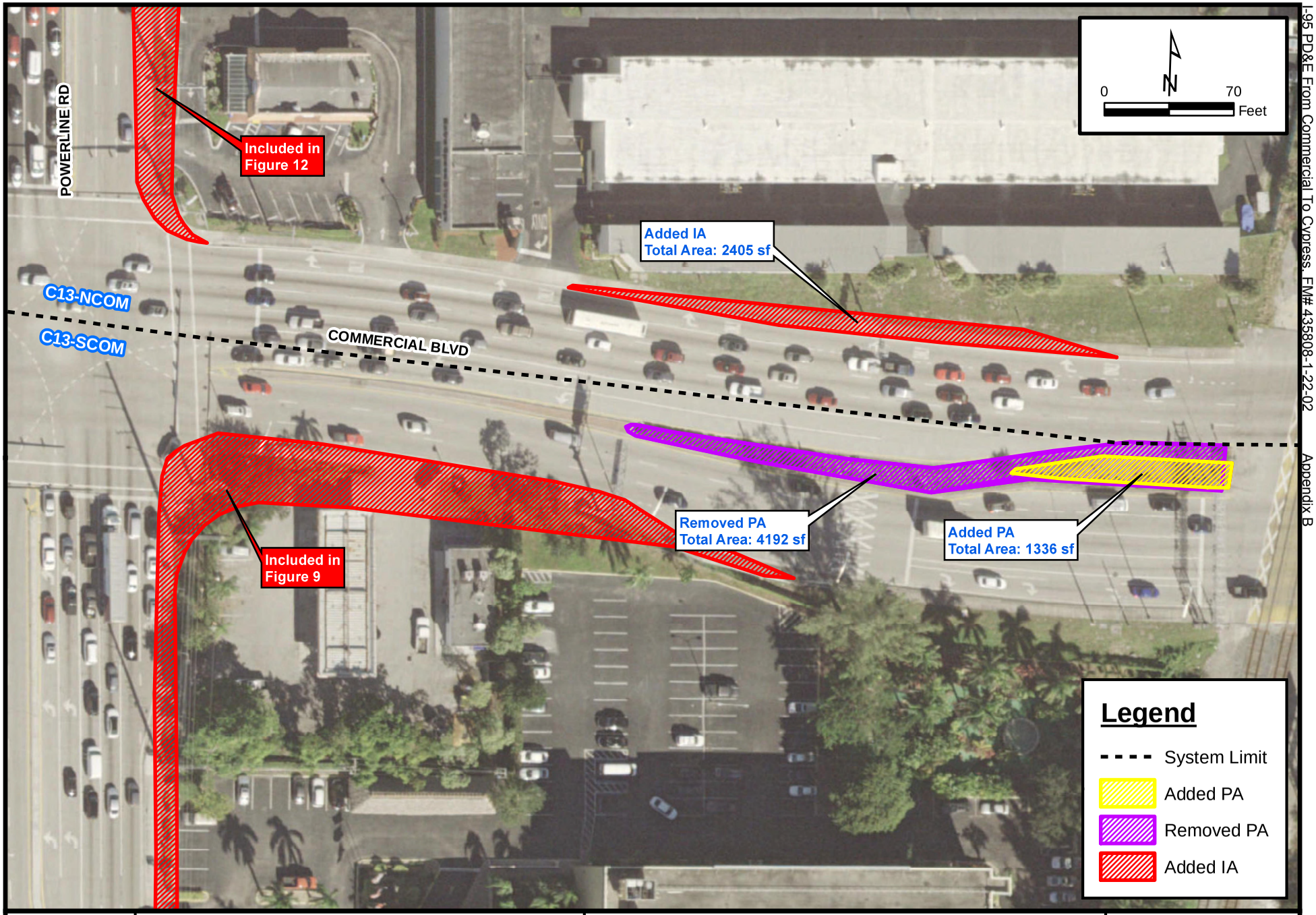
FDOT	I-95 From South Of Commerical Blvd To North Of Cypress Road FM# 435808-1-22-02/ EDTM 14222	**Title:** Cypress Option 1 Impervious Area Map 2	**Figure:** 8



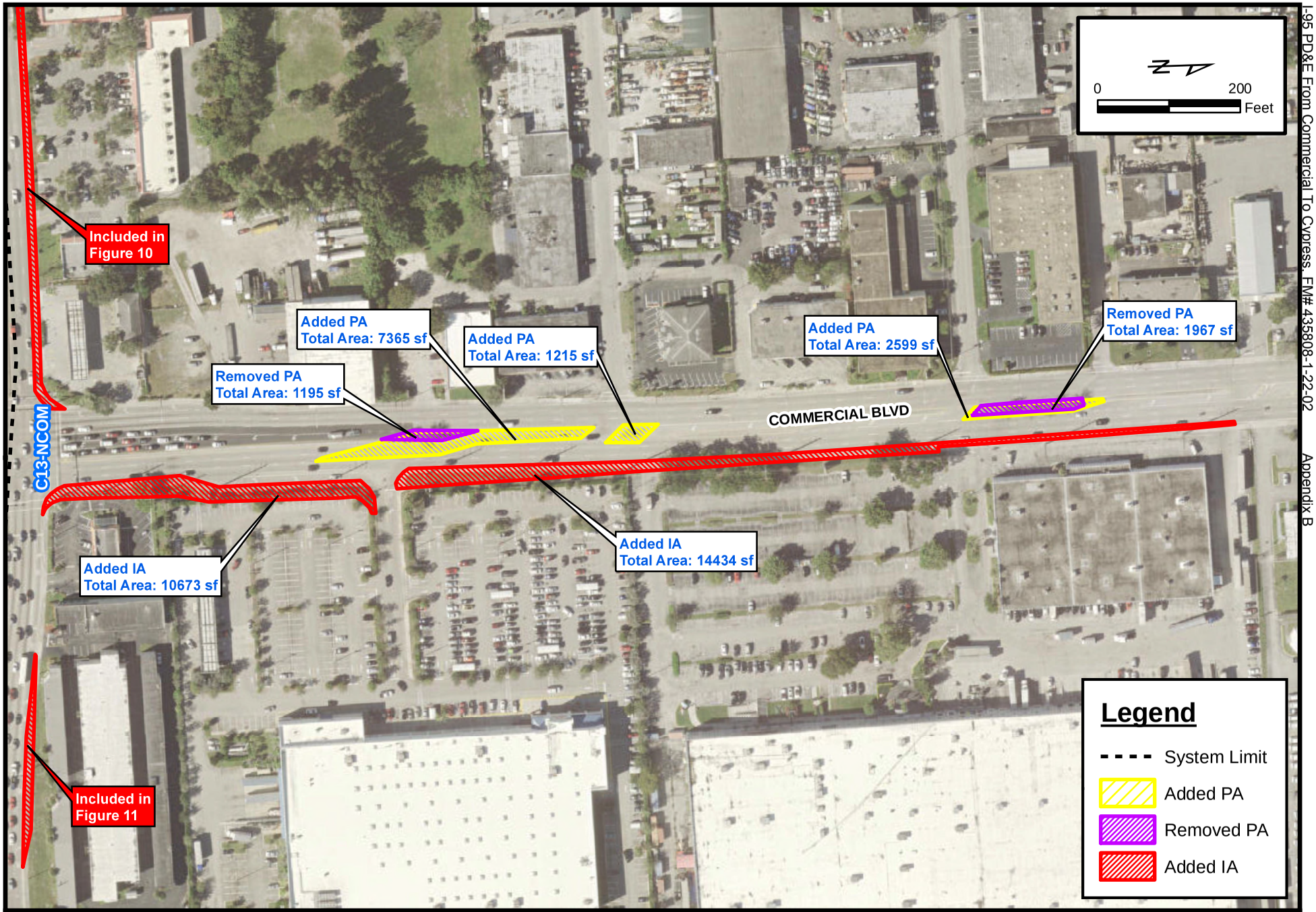
FDOT	I-95 From South Of Commerical Blvd To North Of Cypress Road FM# 435808-1-22-02/ EDTM 14222	**Title:** Powerline Typical Impervious Area Map 1	**Figure:** 9



FDOT	I-95 From South Of Commerical Blvd To North Of Cypress Road FM# 435808-1-22-02/ EDTM 14222	**Title:** Powerline Typical Impervious Area Map 2	**Figure:** 10



FDOT	I-95 From South Of Commerical Blvd To North Of Cypress Road FM# 435808-1-22-02/ EDTM 14222	**Title:** Powerline Typical Impervious Area Map 3	**Figure:** 11



FDOT	I-95 From South Of Commerical Blvd To North Of Cypress Road FM# 435808-1-22-02/ EDTM 14222	**Title:** Powerline Typical Impervious Area Map 4	**Figure:** 12

Project Name: I-95 PD&E Study from Commercial to Cypress **Project No.:** **435808**

DRAINAGE AREA: **C13-SCOM, C13-NCOM, C14-SCYP & C14-NCYP** Designed By: SS

POND No. Composite Date: 12/19/2017

Impervious Area Spreadsheet
(Shaded cells require input data)

C13-SCOM IMPERVIOUS AREA TABLE

Alt.	Figure No.	Removed[1] Perv. Area (sq-ft)	Added[2] Perv. Area (sq-ft)	Removed[3] Imp. Area (sq-ft)	Added[4] Imp. Area (sq-ft)	Net Change[5] Imp. Area (sq-ft)
Preferred	1	1,050	-8,530	0	0	-7,480
	2	1,697	0	0	0	1,697
	3	15,409	-11,673	0	0	3,736
	4	0	-5,040	0	38,152	33,112
	9	6,589	-7,640	0	15,405	14,354
	10	9,247	-10,273	0	12,275	11,249
	11	4,192	-1,336	0	0	2,856
Total (sq-ft)		**38,184**	**-44,492**	**0**	**65,832**	**59,524**
Total (acres)		**0.88**	**-1.02**	**0.00**	**1.51**	**1.37**

[1]Removed Perv. Area = Existing pervious area replaced with impervious area.

[2]Added Perv. Area = Existing impervious area replaced with pervious area.

[3]Removed Imp. Area = Existing impervious area removed.

[4]Added Imp. Area = Addition of impervious area (e.g. widening of existing or new roadway).

[5]Net Change Imp. Area = 1 + 2 + 3 + 4

C13-NCOM IMPERVIOUS AREA TABLE

Alt.	Figure No.	Removed[1] Perv. Area (sq-ft)	Added[2] Perv. Area (sq-ft)	Removed[3] Imp. Area (sq-ft)	Added[4] Imp. Area (sq-ft)	Net Change[5] Imp. Area (sq-ft)
Preferred	1	7,042	-8,793	0	0	-1,751
	2	11,072	-19,218	0	2,459	-5,687
	3	0	-730	0	37,452	36,722
	4	0	-2,485	0	0	-2,485
	5	0	0	0	108,199	108,199
	10	0	0	0	5,156	5,156
	11	0	0	0	2,405	2,405
	12	3,162	-11,179	0	25,107	17,090
Total (sq-ft)		**21,276**	**-42,405**	**0**	**180,778**	**159,649**
Total (acres)		**0.49**	**-0.97**	**0.00**	**4.15**	**3.67**

[1]Removed Perv. Area = Existing pervious area replaced with impervious area.

[2]Added Perv. Area = Existing impervious area replaced with pervious area.

[3]Removed Imp. Area = Existing impervious area removed.

[4]Added Imp. Area = Addition of impervious area (e.g. widening of existing or new roadway).

[5]Net Change Imp. Area = 1 + 2 + 3 + 4

Project Name: I-95 PD&E Study from Commercial to Cypress **Project No.:** **435808**

DRAINAGE AREA: **C13-SCOM, C13-NCOM, C14-SCYP & C14-NCYP** Designed By: SS

POND No. Composite Date: 12/19/2017

Impervious Area Spreadsheet
(Shaded cells require input data)

C14-SCYP IMPERVIOUS AREA TABLE

Alt.	Figure No.	Removed[1] Perv. Area (sq-ft)	Added[2] Perv. Area (sq-ft)	Removed[3] Imp. Area (sq-ft)	Added[4] Imp. Area (sq-ft)	Net Change[5] Imp. Area (sq-ft)
Preferred	6	0	0	0	165,039	165,039
	7	0	-437	-14,693	72,333	57,203
	8	0	0	0	18,099	18,099
Total (sq-ft)		**0**	**-437**	**-14,693**	**255,471**	**240,341**
Total (acres)		**0.00**	**-0.01**	**-0.34**	**5.86**	**5.52**

[1]Removed Perv. Area = Existing pervious area replaced with impervious area.

[2]Added Perv. Area = Existing impervious area replaced with pervious area.

[3]Removed Imp. Area = Existing impervious area removed.

[4]Added Imp. Area = Addition of impervious area (e.g. widening of existing or new roadway).

[5]Net Change Imp. Area = 1 + 2 + 3 + 4

C14-NCYP IMPERVIOUS AREA TABLE

Alt.	Figure No.	Removed[1] Perv. Area (sq-ft)	Added[2] Perv. Area (sq-ft)	Removed[3] Imp. Area (sq-ft)	Added[4] Imp. Area (sq-ft)	Net Change[5] Imp. Area (sq-ft)
Preferred	7	9,401	-21,130	0	10,944	-785
	8	23,212	-29,082	-50835	66,044	9,339
Total (sq-ft)		**32,613**	**-50,212**	**-50,835**	**76,988**	**8,554**
Total (acres)		**0.75**	**-1.15**	**-1.17**	**1.77**	**0.20**

[1]Removed Perv. Area = Existing pervious area replaced with impervious area.

[2]Added Perv. Area = Existing impervious area replaced with pervious area.

[3]Removed Imp. Area = Existing impervious area removed.

[4]Added Imp. Area = Addition of impervious area (e.g. widening of existing or new roadway).

[5]Net Change Imp. Area = 1 + 2 + 3 + 4

Project Name: I-95 PD&E Study from Commercial to Cypress **Project No.** 435808

DRAINAGE AREA: C13-SCOM
Alternative: Preferred

Wet Detention Pond Design Spreadsheet
(Shaded cells require input data)

Designed By: SS
Date: 12/19/2017

WATER QUALITY CRITERIA FROM SFWMD

DATA:		AREAS PRE-DEV.	AREAS POST-D.
FROM STATION	ft	0.00	0.00
TO STATION	ft	4200.00	4200.00
LENGTH	ft	4200.00	4200.00
R. OF WAY WIDTH	ft	477.09	477.09
AVE. PAV. WIDTH	ft		
TOTAL AREA			
INSIDE R. OF WAY	Ac	46.00	46.00
OUTSIDE R. OF W.	Ac	0.00	0.00
TOTAL (At)	Ac	**46.00**	**46.00**
IMPERVIOUS AREA			
PAVED AREAS	Ac	31.27	31.27
Wet Out A.(0.6Ao)	Ac	0.00	0.00
OTHER IMP. AREAS	Ac	0.00	1.37
TOTAL (Ai)	Ac	31.27	32.64
INCREASE IMPERVIOUS			
	Ac		1.37

WET DETENTION		SFWMD PRE-DEV.	SFWMD POST-D.
2.5" on Inc. imperv.	Ac-ft		0.28
Discharge Attenuation	Ac-ft		0.14
Greater of Above	Ac-ft		0.28

Areas Out of Corridor (Ac)			
DESCR.	PRE-DEV.	POST-D.	
Pond	0.00	0.00	
	0.00	0.00	
	0.00	0.00	
	0.00	0.00	
	0.00	0.00	
	0.00	0.00	
	0.00	0.00	
	0.00	0.00	
	0.00	0.00	<=Check
Ao=	**0.00**	**0.00**	Check=>

Prop.Pav. Wth. (ft)	54

Additional Paved Areas		
ITEM	AMOUNT (EA)	UNIT A. (Ac)
Med. Op.	0	0.07
Turn Lane	0	0.14
Turn Out	0	0.07
TOTAL AREAS		0.00

PEAK ATTENUATION: SCS METHOD

SOIL TYPE	PRE-DEVELOP. CN	PRE-DEVELOP. Area (Ac)	POST-DEVELOP. CN	POST-DEVELOP. Area (Ac.)
IMPERVIOUS AREA				
Paved Areas	98	31.27	98	31.27
Lakes and wet areas	98	0.00	98	0.00
Other	98	0.00	98	1.37
SUB-TOTAL (Ai)		31.27		32.64
PERVIOUS AREA				
Gravel roads	91	0.00	91	0.00
Dirt roads	89	0.00	89	0.00
Cultivated land	91	0.00	91	0.00
Pasture or range	89	14.73	89	13.36
Meadow, good cond.	78	0.00	78	0.00
Wood or forest land	83	0.00	83	0.00
Lawns/sod, fair cond.	84	0.00	84	0.00
Other	0	0.00	0	0.00
SUB-TOTAL (Ap)		14.73		13.36
TOTAL AREA (At= Ai+Ap)	**Check =>**	**46.00**	**<===>**	**46.00**
CNw=Σ(A CN)/	95.1		95.4	

DESIGN RAINFALL (25-yr 72-hr) (P)	in	16		16
WATERSHED STORAGE: S=1000/CNw -10		0.52		0.48
DIRECT RUNOFF :R = (P-0.2S)^2/(P+0.8S)	in	15.40		15.44
TOTAL RUNOFF: (Rt=At R/12)	Ac-ft	59.03		59.17
PRE-POST DEVELOPMENT RUNOFF	Ac-ft		**0.14**	

NOTE: Water Quality Controls

Project Name: I-95 PD&E Study from Commercial to Cypress **Project No.** 435808

DRAINAGE AREA: C13-NCOM
Alternative: Preferred

Wet Detention Pond Design Spreadsheet
(Shaded cells require input data)

Designed By: SS
Date: 12/19/2017

WATER QUALITY CRITERIA FROM SFWMD

DATA:		AREAS PRE-DEV.	AREAS POST-D.
FROM STATION	ft	0.00	0.00
TO STATION	ft	3700.00	3700.00
LENGTH	ft	3700.00	3700.00
R. OF WAY WIDTH	ft	553.33	553.33
AVE. PAV. WIDTH	ft		
TOTAL AREA			
INSIDE R. OF WAY	Ac	47.00	47.00
OUTSIDE R. OF W.	Ac	0.00	0.00
TOTAL (At)	Ac	**47.00**	**47.00**
IMPERVIOUS AREA			
PAVED AREAS	Ac	17.13	17.13
Wet Out A.(0.6Ao)	Ac	0.00	0.00
OTHER IMP. AREAS	Ac	0.00	3.67
TOTAL (Ai)	Ac	17.13	20.80
INCREASE IMPERVIOUS			
	Ac		3.67

Areas Out of Corridor (Ac)		
DESCR.	PRE-DEV.	POST-D.
Pond	0.00	0.00
	0.00	0.00
	0.00	0.00
	0.00	0.00
	0.00	0.00
	0.00	0.00
	0.00	0.00
	0.00	0.00
	0.00	0.00
Ao=	**0.00**	**0.00**

<=Check
Check=>

Prop.Pav. Wth. (ft)	54

Additional Paved Areas		
ITEM	AMOUNT (EA)	UNIT A. (Ac)
Med. Op.	0	0.07
Turn Lane	0	0.14
Turn Out	0	0.07
TOTAL AREAS		0.00

WET DETENTION		SFWMD PRE-DEV.	SFWMD POST-D.
2.5" on Inc. imperv.	Ac-ft		0.76
Discharge Attenuation	Ac-ft		0.35
Greater of Above	Ac-ft		0.76

PEAK ATTENUATION: SCS METHOD

SOIL TYPE	PRE-DEVELOP. CN	PRE-DEVELOP. Area (Ac)	POST-DEVELOP. CN	POST-DEVELOP. Area (Ac.)
IMPERVIOUS AREA				
Paved Areas	98	17.13	98	17.13
Lakes and wet areas	98	0.00	98	0.00
Other	98	0.00	98	3.67
SUB-TOTAL (Ai)		17.13		20.80
PERVIOUS AREA				
Gravel roads	91	0.00	91	0.00
Dirt roads	89	0.00	89	0.00
Cultivated land	91	0.00	91	0.00
Pasture or range	89	29.87	89	26.20
Meadow, good cond.	78	0.00	78	0.00
Wood or forest land	83	0.00	83	0.00
Lawns/sod, fair cond.	84	0.00	84	0.00
Other	0	0.00	0	0.00
SUB-TOTAL (Ap)		29.87		26.20
TOTAL AREA (At= Ai+Ap)	**Check =>**	**47.00**	**<===>**	**47.00**
CNw=Σ(A CN)/	92.3		93.0	

DESIGN RAINFALL (25-yr 72-hr) (P)	in	16		16
WATERSHED STORAGE: S=1000/CNw -10		0.83		0.75
DIRECT RUNOFF :R = (P-0.2S)^2/(P+0.8S)	in	15.04		15.13
TOTAL RUNOFF: (Rt=At R/12)	Ac-ft	58.91		59.26
PRE-POST DEVELOPMENT RUNOFF	Ac-ft		**0.35**	

NOTE: Water Quality Controls

Project Name: I-95 PD&E Study from Commercial to Cypress **Project No.** 435808

DRAINAGE AREA: C14-SCYP
Alternative: Preferred

Wet Detention Pond Design Spreadsheet
(Shaded cells require input data)

Designed By: SS
Date: 12/19/2017

WATER QUALITY CRITERIA FROM SFWMD

DATA:		AREAS PRE-DEV.	AREAS POST-D.
FROM STATION	ft	0.00	0.00
TO STATION	ft	4359.00	4359.00
LENGTH	ft	4359.00	4359.00
R. OF WAY WIDTH	ft	739.49	739.49
AVE. PAV. WIDTH	ft		
TOTAL AREA			
INSIDE R. OF WAY	Ac	74.00	74.00
OUTSIDE R. OF W.	Ac	0.00	0.00
TOTAL (At)	Ac	**74.00**	**74.00**
IMPERVIOUS AREA			
PAVED AREAS	Ac	42.07	42.07
Wet Out A.(0.6Ao)	Ac	0.00	0.00
OTHER IMP. AREAS	Ac	0.00	5.52
TOTAL (Ai)	Ac	42.07	47.59
INCREASE IMPERVIOUS			
	Ac		5.52

<=Check
Check=>

Areas Out of Corridor (Ac)		
DESCR.	PRE-DEV.	POST-D.
Pond	0.00	0.00
	0.00	0.00
	0.00	0.00
	0.00	0.00
	0.00	0.00
	0.00	0.00
	0.00	0.00
	0.00	0.00
	0.00	0.00
	0.00	0.00
Ao=	**0.00**	**0.00**

Prop.Pav. Wth. (ft)	54

Additional Paved Areas		
ITEM	AMOUNT (EA)	UNIT A. (Ac)
Med. Op.	0	0.07
Turn Lane	0	0.14
Turn Out	0	0.07
TOTAL AREAS		0.00

PEAK ATTENUATION: SCS METHOD

SOIL TYPE	PRE-DEVELOP. CN	PRE-DEVELOP. Area (Ac)	POST-DEVELOP. CN	POST-DEVELOP. Area (Ac.)
IMPERVIOUS AREA				
Paved Areas	98	42.07	98	42.07
Lakes and wet areas	98	0.00	98	0.00
Other	98	0.00	98	5.52
SUB-TOTAL (Ai)		42.07		47.59
PERVIOUS AREA				
Gravel roads	91	0.00	91	0.00
Dirt roads	89	0.00	89	0.00
Cultivated land	91	0.00	91	0.00
Pasture or range	89	31.93	89	26.41
Meadow, good cond.	78	0.00	78	0.00
Wood or forest land	83	0.00	83	0.00
Lawns/sod, fair cond.	84	0.00	84	0.00
Other	0	0.00	0	0.00
SUB-TOTAL (Ap)		31.93		26.41
TOTAL AREA (At= Ai+Ap)	**Check =>**	**74.00**	**<===>**	**74.00**
CNw=Σ(A CN)/	94.1		94.8	

DESIGN RAINFALL (25-yr 72-hr) (P)	in	16		16
WATERSHED STORAGE: S=1000/CNw -10		0.63		0.55
DIRECT RUNOFF :R = (P-0.2S)^2/(P+0.8S)	in	15.27		15.36
TOTAL RUNOFF: (Rt=At R/12)	Ac-ft	94.17		94.72
PRE-POST DEVELOPMENT RUNOFF	Ac-ft		**0.55**	

WET DETENTION

		SFWMD PRE-DEV.	SFWMD POST-D.
2.5" on Inc. imperv.	Ac-ft		1.15
Discharge Attenuation	Ac-ft		0.55
Greater of Above	Ac-ft		1.15

NOTE: Water Quality Controls

Project Name: I-95 PD&E Study from Commercial to Cypress **Project No.** 435808

DRAINAGE AREA: C14-NCYP
Alternative: Preferred

Wet Detention Pond Design Spreadsheet
(Shaded cells require input data)

Designed By: SS
Date: 12/19/2017

WATER QUALITY CRITERIA FROM SFWMD

DATA:		AREAS PRE-DEV.	AREAS POST-D.
FROM STATION	ft	0.00	0.00
TO STATION	ft	2583.00	2583.00
LENGTH	ft	2583.00	2583.00
R. OF WAY WIDTH	ft	1163.62	1163.62
AVE. PAV. WIDTH	ft		
TOTAL AREA			
INSIDE R. OF WAY	Ac	69.00	69.00
OUTSIDE R. OF W.	Ac	0.00	0.00
TOTAL (At)	Ac	**69.00**	**69.00**
IMPERVIOUS AREA			
PAVED AREAS	Ac	26.68	26.68
Wet Out A.(0.6Ao)	Ac	0.00	0.00
OTHER IMP. AREAS	Ac	0.00	0.20
TOTAL (Ai)	Ac	26.68	26.88
INCREASE IMPERVIOUS			
	Ac		0.20

WET DETENTION		SFWMD PRE-DEV.	SFWMD POST-D.
2.5" on Inc. imperv.	Ac-ft		0.04
Discharge Attenuation	Ac-ft		0.00
Greater of Above	Ac-ft		0.04

Areas Out of Corridor (Ac)			
DESCR.	PRE-DEV.	POST-D.	
Pond	0.00	0.00	
	0.00	0.00	
	0.00	0.00	
	0.00	0.00	
	0.00	0.00	
	0.00	0.00	
	0.00	0.00	
	0.00	0.00	
	0.00	0.00	<=Check
Ao=	**0.00**	**0.00**	Check=>

Prop.Pav. Wth. (ft)	54

Additional Paved Areas		
ITEM	AMOUNT (EA)	UNIT A. (Ac)
Med. Op.	0	0.07
Turn Lane	0	0.14
Turn Out	0	0.07
TOTAL AREAS		0.00

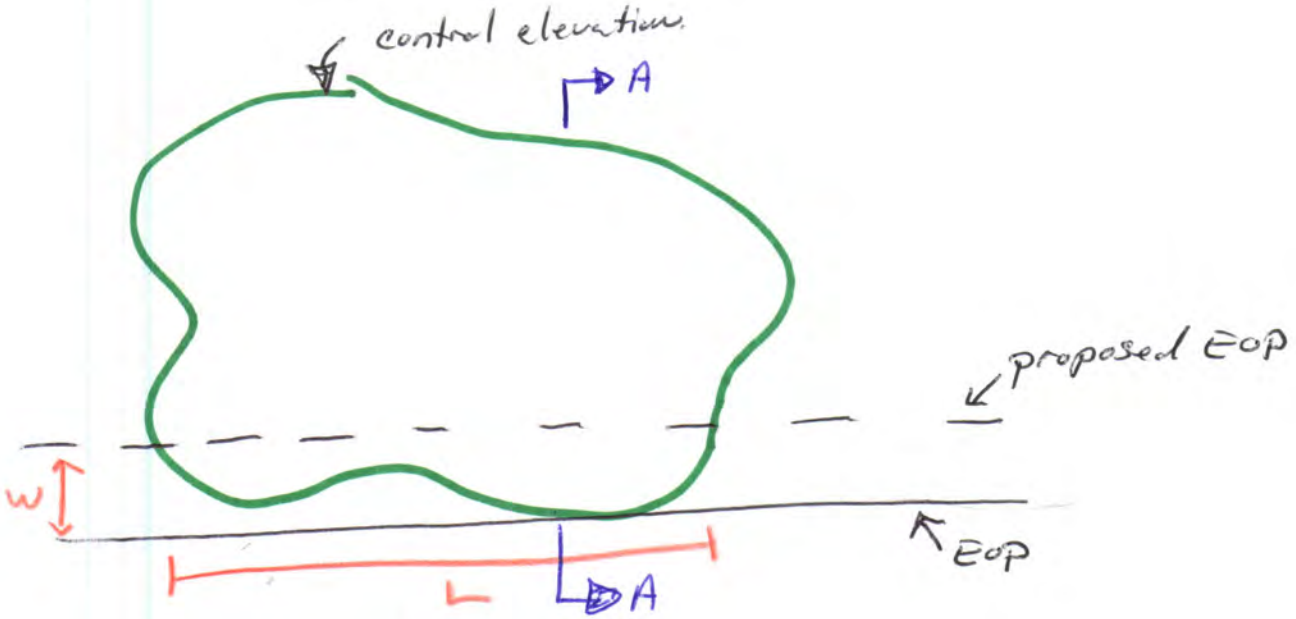
PEAK ATTENUATION: SCS METHOD

SOIL TYPE	PRE-DEVELOP. CN	PRE-DEVELOP. Area (Ac)	POST-DEVELOP. CN	POST-DEVELOP. Area (Ac.)
IMPERVIOUS AREA				
Paved Areas	98	26.68	98	26.68
Lakes and wet areas	98	0.00	98	0.00
Other	98	0.00	98	0.20
SUB-TOTAL (Ai)		26.68		26.88
PERVIOUS AREA				
Gravel roads	91	0.00	91	0.00
Dirt roads	89	0.00	89	0.00
Cultivated land	91	0.00	91	0.00
Pasture or range	89	42.32	89	42.12
Meadow, good cond.	78	0.00	78	0.00
Wood or forest land	83	0.00	83	0.00
Lawns/sod, fair cond.	84	0.00	84	0.00
Other	0	0.00	0	0.00
SUB-TOTAL (Ap)		42.32		42.12
TOTAL AREA (At= Ai+Ap)	**Check =>**	**69.00**	**<===>**	**69.00**
CNw=Σ(A CN)/	92.5		92.5	

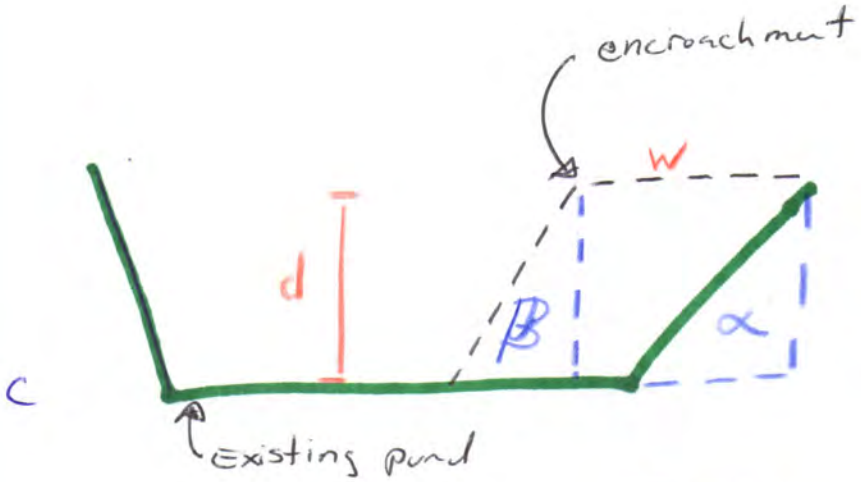
DESIGN RAINFALL (25-yr 72-hr) (P)	in	13.5		13.5
WATERSHED STORAGE: S=1000/CNw -10		0.81		0.81
DIRECT RUNOFF :R = (P-0.2S)^2/(P+0.8S)	in	12.57		12.57
TOTAL RUNOFF: (Rt=At R/12)	Ac-ft	72.30		72.30
PRE-POST DEVELOPMENT RUNOFF	Ac-ft		**0.00**	

NOTE: Water Quality Controls

Plan View



Cross Section A-A



$\beta \approx \alpha$

Treatment Volume encroachment = (d)(W)(L)

Project Name: I-95 PD&E Study from Commercial to Cypress **Project No.: 435808**

DRAINAGE AREA: **C13-SCOM & C13-NCOM** Designed By: SS

POND No. Composite Date: 8/8/2017

Treatment Summary Spreadsheet
(Shaded cells require input data)

Existing Surplus Capacity

[1]Phase 3A Sub-Basin	Com-Cyp PD&E Basin	Pond/Swale Name	Basin Area (ac)	Imp. Area (ac)	1" Over Total (ac-ft)	2.5" Over Imp. (ac-ft)	[3]Exist Treat. Req'd (ac-ft)	Wet Det. Treat. Prov'd (ac-ft)	Dry Det. Treat. Prov'd (ac-ft)	Dry/Wet RetTreat.Prov'd (ac-ft)	[4]Total Treat. Prov'd (ac-ft)	[5]Exist. Surplus (ac-ft)
B19-17	[2]C13-Other	Swale 19-10A	7.58	4.74	0.63	0.99	0.99	0.00	0.00	1.35	2.70	1.71
B19-19B		-	3.12	3.12	0.26	0.65	0.65	0.00	0.00	0.00	0.00	-0.65
B19-20		Swale 19-8	5.77	3.73	0.48	0.78	0.78	0.00	0.00	0.99	1.98	1.20
B19-21		Swale 19-10B	2.26	1.13	0.19	0.24	0.24	0.00	0.00	0.72	1.44	1.20
B19-21Of		-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B19-22A		-	0.47	0.47	0.04	0.10	0.10	0.00	0.00	0.00	0.00	-0.10
B19-22B		-	4.52	4.52	0.38	0.94	0.94	0.00	0.00	0.00	0.00	-0.94
		Total:	23.72	17.71	1.98	3.69	3.69	0.00	0.00	3.06	6.12	2.43
B19-23	C13-SCOM	Swale 19-10C	13.78	8.04	1.15	1.68	1.68	0.00	0.00	1.81	3.62	1.95
B19-24		Swale 19-9	2.41	2.41	0.20	0.50	0.50	0.00	0.00	0.22	0.44	-0.06
B19-25		-	4.03	1.82	0.34	0.38	0.38	0.00	0.00	0.00	0.00	-0.38
B19-26		-	6.10	3.53	0.51	0.74	0.74	0.00	0.00	0.00	0.00	-0.74
B19-27A		-	0.98	0.58	0.08	0.12	0.12	0.00	0.00	0.00	0.00	-0.12
B19-27B		-	0.12	0.12	0.01	0.03	0.03	0.00	0.00	0.00	0.00	-0.03
B19-28A		-	3.29	2.43	0.27	0.51	0.51	0.00	0.00	0.00	0.00	-0.51
B19-29A		-	0.13	0.08	0.01	0.02	0.02	0.00	0.00	0.00	0.00	-0.02
B19-29B		-	0.48	0.48	0.04	0.10	0.10	0.00	0.00	0.00	0.00	-0.10
B19-29C		-	0.03	0.03	0.00	0.01	0.01	0.00	0.00	0.00	0.00	-0.01
B19-29D		-	0.30	0.30	0.03	0.06	0.06	0.00	0.00	0.00	0.00	-0.06
		Total:	31.65	19.82	2.64	4.13	4.13	0.00	0.00	2.03	4.07	-0.06
B19-27C	C13-NCOM	-	0.17	0.17	0.01	0.04	0.04	0.00	0.00	0.00	0.00	-0.04
B19-28B		-	0.15	0.15	0.01	0.03	0.03	0.00	0.00	0.00	0.00	-0.03
B19-30A		Swale 19-13	0.13	0.13	0.01	0.03	0.03	0.00	0.00	0.26	0.52	0.49
B19-30B		-	0.03	0.03	0.00	0.01	0.01	0.00	0.00	0.00	0.00	-0.01
B19-30C		-	0.18	0.18	0.02	0.04	0.04	0.00	0.00	0.00	0.00	-0.04
B19-31		-	7.38	5.66	0.62	1.18	1.18	0.00	0.00	0.00	0.00	-1.18
B19-32A		-	0.12	0.07	0.01	0.01	0.01	0.00	0.00	0.00	0.00	-0.01
B19-32B		-	3.60	0.64	0.30	0.13	0.13	0.00	0.00	0.00	0.00	-0.13
B19-33A		-	0.16	0.12	0.01	0.03	0.03	0.00	0.00	0.00	0.00	-0.03
B19-33B		-	1.90	0.82	0.16	0.17	0.17	0.00	0.00	0.00	0.00	-0.17
B19-34		Swale 19-15	2.36	1.08	0.20	0.23	0.23	0.00	0.00	0.45	0.90	0.68
B19-35		Swale 19-16	8.74	5.57	0.73	1.16	1.16	0.00	0.00	0.29	0.58	-0.58
B19-36		Swale 19-17	6.62	3.73	0.55	0.78	0.78	0.00	0.00	0.97	1.94	1.16

Project Name: I-95 PD&E Study from Commercial to Cypress **Project No.: 435808**

DRAINAGE AREA: **C13-SCOM & C13-NCOM** Designed By: SS

POND No. Composite Date: 8/8/2017

Treatment Summary Spreadsheet
(Shaded cells require input data)

Existing Surplus Capacity

[1]Phase 3A Sub-Basin	Com-Cyp PD&E Basin	Pond/Swale Name	Basin Area (ac)	Imp. Area (ac)	1" Over Total (ac-ft)	2.5" Over Imp. (ac-ft)	[3]Exist Treat. Req'd (ac-ft)	Wet Det. Treat. Prov'd (ac-ft)	Dry Det. Treat. Prov'd (ac-ft)	Dry/Wet RetTreat.Prov'd (ac-ft)	[4]Total Treat. Prov'd (ac-ft)	[5]Exist. Surplus (ac-ft)
B19-37		-	2.17	2.17	0.18	0.45	0.45	0.00	0.00	0.00	0.00	-0.45
		Total:	33.71	20.52	2.81	4.28	4.28	0.00	0.00	1.97	3.95	-0.32

[1]These sub-basin are apart of System 19E in the I-95 Express Lanes Phase 3A Project. Only sub-basins with onsite contributing area was included as documented in the permitted I-95 Express Lanes Phase 3A drainage report.

[2]C13-Other includes sub-basins in System 19E that are not included in the I-95 Commerial to Cypress PD&E Study.

[3]Existing treatment required is determined to be 2.5" over the imperious area as documented in the permitted I-95 Express Lanes Phase 3A drainage report. Existing treatment volume required is based on Wet Detention requirements.

[4]Sum of all treatment provided. Dry/Wet Retention and Dry Detention volumes were divided by 0.50 and 0.75, respectively to account for 50% and 25% credit.

[5]Existing Surplus = (Total Treat. Prov'd) - (Exist.Treat. Req'd.)

Existing Treatment Summary

Com-Cyp PD&E Basin	Exist Treat. Req'd (ac-ft)	Total Treat. Prov'd (ac-ft)	Exist. Surplus (ac-ft)
C13-Other	3.68	6.12	2.43
C13-SCOM	4.13	4.07	-0.06
C13-NCOM	4.28	3.95	-0.32
Total:	12.08	14.14	2.06

Project Name: I-95 PD&E Study from Commercial to Cypress **Project No.: 435808**

DRAINAGE AREA: **C13-SCOM** Designed By: SS

POND No. Composite Date: 12/19/2017

Treatment Summary Spreadsheet
(Shaded cells require input data)

Treatment Volume Encroachment					
Basin Info.		Preferred Alt.			
Sub-Basin	Pond Name	Enc. Length (ft.)	Enc. Width (ft.)	Enc. Depth (ft.)	[1]Enc. Volume (ac-ft.)
B19-35	Swale 19-10C	150	7.00	1.00	0.02
	Total:				0.02

[1]Encroachment volume was calculated using a rectangular approach, assuming the cross section of the pond is trapezoidal. Refer to pond cross section sketch.

Treatment Summary					
Basin Info.		Preferred Alt.			
Basin	Exist. Surplus (ac-ft.)	Enc. Volume (ac-ft.)	[1]Addtn. Treat. Req'd (ac-ft.)	Prop. Treat. (ac-ft.)	[2]Treat. Balance (ac-ft.)
C13-SCOM	-0.06	0.02	0.28	2.43	2.07

[1]Addtn. Treat. Req'd = total treatment volume required due to the increase in impervious area.

[2]Treatment Balance = (Exist. Surplus) - (Enc. Volume) - (Addtn. Treat. Req'd) + (Prop. Treat. Prov'd)

Project Name: I-95 PD&E Study from Commercial to Cypress **Project No.: 435808**

DRAINAGE AREA: **C13-NCOM** Designed By: SS

POND No. Composite Date: 12/19/2017

Treatment Summary Spreadsheet
(Shaded cells require input data)

Treatment Volume Encroachment					
Basin Info.		Preferred Alt.			
Sub-Basin	Pond Name	Enc. Length (ft.)	Enc. Width (ft.)	Enc. Depth (ft.)	[1]Enc. Volume (ac-ft.)
B19-35	Swale 19-16	1030	12.50	1.00	0.30
	Total:				0.30

[1]Encroachment volume was calculated using a rectangular approach, assuming the cross section of the pond is trapezoidal. Refer to pond cross section sketch.

Treatment Summary					
Basin Info.		Preferred Alt.			
Basin	Exist. Surplus (ac-ft.)	Enc. Volume (ac-ft.)	[1]Addtn. Treat. Req'd (ac-ft.)	Prop. Treat. (ac-ft.)	[2]Treat. Balance (ac-ft.)
C13-NCOM	-0.32	0.30	0.76	2.07	0.69

[1]Addtn. Treat. Req'd = total treatment volume required due to the increase in impervious area.

[2]Treatment Balance = (Exist. Surplus) - (Enc. Volume) - (Addtn. Treat. Req'd) + (Prop. Treat. Prov'd)

Project Name: I-95 PD&E Study from Commercial to Cypress **Project No.: 435808**

DRAINAGE AREA: **C14-SCYP & C14-NCYP** Designed By: SS

POND No. Composite Date: 8/8/2017

Treatment Summary Spreadsheet
(Shaded cells require input data)

Existing Surplus Capacity												
[1]Phase 3A Sub-Basin	Com-Cyp PD&E Basin	Pond/Swale Name	Basin Area (ac)	Imp. Area (ac)	1" Over Total (ac-ft)	2.5" Over Imp. (ac-ft)	[2]Exist Treat. Req'd (ac-ft)	Wet Det. Treat. Prov'd (ac-ft)	Dry Det. Treat. Prov'd (ac-ft)	Dry/Wet RetTreat.Prov'd (ac-ft)	[3]Total Treat. Prov'd (ac-ft)	[4]Exist. Surplus (ac-ft)
B20-1	C14-SCYP	Swale 20-1	4.30	3.17	0.36	0.66	0.66	0.00	0.05	0.00	0.07	-0.59
B20-2		Swale 20-2	8.39	6.46	0.70	1.35	1.35	0.00	0.16	0.00	0.21	-1.13
B20-3		-	2.39	0.24	0.20	0.05	0.05	0.00	0.00	0.00	0.00	-0.05
B20-4		Swale 20-4	8.89	2.98	0.74	0.62	0.62	0.00	0.02	0.00	0.03	-0.59
B20-5		Swale 20-5	3.37	1.10	0.28	0.23	0.23	0.00	0.21	0.00	0.28	0.05
B20-6		Swale 20-6	8.06	3.11	0.67	0.65	0.65	0.00	0.46	0.00	0.61	-0.03
B20-8		-	2.54	2.54	0.21	0.53	0.53	0.00	0.00	0.00	0.00	-0.53
B20-9		Pond 20-1	4.35	2.35	0.36	0.49	0.49	0.77	0.00	0.00	0.77	0.28
B20-12		Swale 20-12B	2.47	1.29	0.21	0.27	0.27	0.00	0.03	0.00	0.04	-0.23
B20-13		Pond 20-2	3.62	2.03	0.30	0.42	0.42	0.00	0.16	0.00	0.21	-0.21
B20-16		-	4.17	3.12	0.35	0.65	0.65	0.00	0.00	0.00	0.00	-0.65
B20-17		-	2.19	1.80	0.18	0.38	0.38	0.00	0.00	0.00	0.00	-0.38
B20-18		Pond 20-3	0.78	0.00	0.07	0.00	0.00	0.16	0.00	0.00	0.16	0.16
B20-19		Pond 20-4	0.46	0.03	0.04	0.01	0.01	0.00	0.26	0.00	0.35	0.34
B20-25A		Swale 20-12A	2.78	1.25	0.23	0.26	0.26	0.00	0.33	0.00	0.44	0.18
B20-25B		-	0.26	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B20-27		-	0.64	0.48	0.05	0.10	0.10	0.00	0.00	0.00	0.00	-0.10
B20-33		-	0.30	0.30	0.03	0.06	0.06	0.00	0.00	0.00	0.00	-0.06
		Total:	**59.96**	**32.27**	**5.00**	**6.72**	**6.72**	**0.93**	**1.68**	**0.00**	**3.17**	**-3.54**
B20-20	C14-NCYP	Swale 20-9	0.97	0.40	0.08	0.08	0.08	0.00	0.05	0.00	0.07	-0.02
B20-21		Swale 20-10	3.51	1.55	0.29	0.32	0.32	0.00	0.21	0.00	0.28	-0.04
B20-22		Pond 20-5	10.41	1.77	0.87	0.37	0.37	0.00	3.17	0.00	4.23	3.86
B20-23		Pond 20-6	9.57	6.06	0.80	1.26	1.26	0.00	0.66	0.00	0.88	-0.38
B20-24		-	11.03	1.44	0.92	0.30	0.30	0.00	0.00	0.00	0.00	-0.30
B20-26		Pond 20-7	9.68	3.37	0.81	0.70	0.70	0.00	0.85	0.00	1.13	0.43
B20-28		-	0.57	0.53	0.05	0.11	0.11	0.00	0.00	0.00	0.00	-0.11
B20-29		-	0.54	0.10	0.05	0.02	0.02	0.00	0.00	0.00	0.00	-0.02
B20-30		-	1.21	0.27	0.10	0.06	0.06	0.00	0.00	0.00	0.00	-0.06
B20-31		Pond 20-8	9.74	5.35	0.81	1.11	1.11	0.00	0.86	0.00	1.15	0.03
B20-32		Swale 20-14	2.83	0.65	0.24	0.14	0.14	0.00	0.42	0.00	0.56	0.42
B20-34		-	5.21	1.02	0.43	0.21	0.21	0.00	0.00	0.00	0.00	-0.21
B20-35		-	0.45	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B20-34		-	0.52	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Project Name: I-95 PD&E Study from Commercial to Cypress **Project No.: 435808**

DRAINAGE AREA: **C14-SCYP & C14-NCYP** Designed By: SS

POND No. Composite Date: 8/8/2017

Treatment Summary Spreadsheet
(Shaded cells require input data)

Existing Surplus Capacity

[1]Phase 3A Sub-Basin	Com-Cyp PD&E Basin	Pond/Swale Name	Basin Area (ac)	Imp. Area (ac)	1" Over Total (ac-ft)	2.5" Over Imp. (ac-ft)	[2]Exist Treat. Req'd (ac-ft)	Wet Det. Treat. Prov'd (ac-ft)	Dry Det. Treat. Prov'd (ac-ft)	Dry/Wet RetTreat.Prov'd (ac-ft)	[3]Total Treat. Prov'd (ac-ft)	[4]Exist. Surplus (ac-ft)
		Total:	**66.24**	**22.51**	**5.52**	**4.69**	**4.69**	**0.00**	**6.22**	**0.00**	**8.29**	**3.60**

[1]These sub-basin are apart of System 19E in the I-95 Express Lanes Phase 3A Project. Only sub-basins with onsite contributing area was included as documented in the permitted I-95 Express Lanes Phase 3A drainage report.

[2]Existing treatment required is determined to be 2.5" over the imperious area as documented in the permitted I-95 Express Lanes Phase 3A drainage report. Existing treatment volume required is based on Wet Detention requirements.

[3]Sum of all treatment provided. Dry/Wet Retention and Dry Detention volumes were divided by 0.50 and 0.75, respectively to account for 50% and 25% credit.

[4]Existing Surplus = (Total Treat. Prov'd) - (Exist.Treat. Req'd.)

Existing Treatment Summary

Com-Cyp PD&E Basin	Exist Treat. Req'd (ac-ft)	Total Treat. Prov'd (ac-ft)	Exist. Surplus (ac-ft)
C14-SCYP	6.72	3.18	-3.54
C14-NCYP	4.69	8.29	3.60
Total:	**11.41**	**11.47**	**0.06**

Project Name: I-95 PD&E Study from Commercial to Cypress **Project No.: 435808**

DRAINAGE AREA: **C14-SCYP** Designed By: SS

POND No. Composite Date: 12/19/2017

Treatment Summary Spreadsheet
(Shaded cells require input data)

Treatment Volume Encroachment					
Basin Info.		Cypress Alt. 1			
Sub-Basin	Pond Name	Enc. Length (ft.)	Enc. Width (ft.)	Enc. Depth (ft.)	[1]Enc. Volume (ac-ft.)
B20-19	Pond 20-4	73	20.45	1.17	0.04
B20-18	Pond 20-3	100	22.30	0.48	0.02
B20-9	Pond 20-1	115	77.50	0.48	0.10
B20-13	Pond 20-2	163	58.28	0.48	0.10
B20-6	Swale 20-6	830	21.65	0.40	0.17
B20-25A	Swale 20-12A	720	4.84	0.40	0.03
B20-2	Swale 20-2	503	34.00	0.40	0.16
	Total:				0.62

[1]Encroachment volume was calculated using a rectangular approach, assuming the cross section of the pond is trapezoidal. Refer to pond cross section sketch.

Provided Treatment						
Pond Info			Volume			
Sub - Basin	Pond Name	Pond Type	Bottom Area (acre)	Increase Ctrl. Elv. (ft)	[1]Dry Det. Vol. Increase (ac-ft.)	Wet Det. Vol. Increase (ac-ft.)
B20-20	Swale 20-9	Dry Det.	0.09	0.17	0.01	0.02
B20-21	Swale 20-10	Dry Det.	0.42	0.17	0.07	0.09
B20-22	Pond 20-5	Dry Det.	6.57	0.17	1.08	1.45
B20-23	Pond 20-6	Dry Det.	1.36	0.17	0.22	0.30
B20-26	Pond 20-7	Dry Det.	1.23	0.17	0.20	0.27
B20-31	Pond 20-8	Dry Det.	1.76	0.17	0.29	0.39
B20-32	Swale 20-14	Dry Det.	0.71	0.17	0.12	0.16
		Total:	**12.14**	**1.16**	**2.00**	**2.67**

[1]Increase in treatment volume for dry detention ponds in System C14-NCYP.

[2]C14-NCYP Sur. = (Existing Surplus in System C14-NCYP) - (Treatment Required for System 14-NCYP)

[3]Prop. Treat. Prov'd = (Wet Det. Vol. Increase) + (C14-NCYP Sur.)

Treatment Summary					
Basin Info.		Cypress Alt. 1			
Basin	Exist. Surplus (ac-ft.)	Enc. Volume (ac-ft.)	[1]Addtn. Treat. Req'd (ac-ft.)	Prop. Treat. Prov'd (ac-ft.)	[2]Treat. Balance (ac-ft.)
C14-SCYP	-3.54	0.62	1.15	6.23	0.92

[1]Addtn. Treat. Req'd = total treatment volume required due to the increase in impervious area.

[2]Treatment Balance = (Exist. Surplus) - (Enc. Volume) - (Addtn. Treat. Req'd) + (Prop. Treat. Prov'd)

Project Name: I-95 PD&E Study from Commercial to Cypress **Project No.: 435808**

DRAINAGE AREA: **C14-NCYP** Designed By: SS

POND No. Composite Date: 12/19/2017

Treatment Summary Spreadsheet
(Shaded cells require input data)

Treatment Summary					
Basin Info.		Preferred Alt.			
Basin	Exist. Surplus (ac-ft.)	Enc. Volume (ac-ft.)	[1]Addtn. Treat. Req'd (ac-ft.)	Prop. Treat. (ac-ft.)	[2]Treat. Balance (ac-ft.)
C14-NCYP	3.60	0.00	0.04	2.67	6.23

[1]Addtn. Treat. Req'd = total treatment volume required due to the increase in impervious area.

[2]Treatment Balance = (Exist. Surplus) - (Enc. Volume) - (Addtn. Treat. Req'd) + (Prop. Treat. Prov'd)

APPENDIX C

(Meetings)

C1-2: SFWMD Meeting Notes

Meeting started at 10:40 AM: FM 435808-1-22-02

Attendees:

Name	Organization	Email Address
Brian Voelker	E Sciences	bvoelker@esciencesinc.com
Roberto Gutierrez	Stantec	roberto.gutierrez@stantec.com
Craig Schmittler	Stantec	craig.schmittler@stantec.com
Tommy Ruiz	Snubbs Consulting	tommy.ruiz@snubbs.com
Hui Shi	FDOT D4	hui.shi@dot.state.fl.us
Claudia Calvo	FDOT D4	claudia.calvo@dot.state.fl.us
Hanzhi Song	FDOT D4	hanzhi.song@dot.state.fl.us
Carlos de Rojas	SFWMD	cderojas@sfwmd.gov
Morgan Reins	SFWMD	mreins@sfwmd.gov
Barbara Conmy	SFWMD	bconmy@sfwmd.gov
Jennifer Schull	NOAA NMFS	jennifer.schull@noaa.gov
Tarrie Ostrofsky	USACE	tarrie.l.ostrofsky@usace.army.mil

District: Four
FPID/FM Number: 435808-1-22-02
FDOT Project Manager: Nadir Rodrigues
Consultant/Company Name: Stantec Consulting Services, Inc. with subconsultant Snubbs Consulting Inc.
SR/Local Name: SR 9/I-95.
Project Limits: from south of SR 870/Commercial Boulevard to north of Cypress Creek Road.
General Scope: The Florida Department of Transportation (FDOT) District Four is conducting a Project Development and Environment (PD&E) Study for improvements to the Cypress Creek Road and SR 870/Commercial Boulevard interchanges and along I-95 from South of SR 870/Commercial Boulevard to North of Cypress Creek Road, a distance of approximately two miles in Broward County, Florida.
Requested Attendees: SFWMD Environmental Resources, Surface Water Management
Discussion Items:

- Roberto Gutierrez (Stantec) gave a general overview of the project:
  - Reiterated general scope items listed above.
  - Replacing three consecutive on-ramps with one on-ramp.
  - No improvements to I-95 proposed.
  - North Andrews Avenue Bridge over I-95 will be reconstructed.
  - Minor wetland impacts anticipated along west side of I-95.
- Craig Schmittler (Stantec) provided some additional project information:
  - Project will result in net increase in swale acreage.
  - No listed wildlife species issues were identified.
  - There is an existing SFWMD ERP and USACE Individual Permit for the project area; swales were included in ERP.
  - Adding additional water to existing wetlands may improve hydrology in those wetlands and reduce invasive/exotic plant coverage.
- Tommy Ruiz (Snubbs Consulting) provided project drainage information:
  - Project falls within two drainage basins (north and south).
    - South drainage basin has surplus storage; project will use this surplus to offset added impervious areas.

- For the portion of the project in the north drainage basin, control structures in the pond at the Cypress Creek Road intersection will provide added treatment for added impervious areas.

Meeting ended at 10:55 AM.

APPENDIX D

(Geotechnical Data)

D1-12: Geotech Testing Inventory

October 1, 2013

Stantec Consulting, Inc.
901 Ponce de Leon Boulevard, Suite 900
Coral Gables, Florida 33134

Attention: Ms. Silvia Beltre, P.E.
Project Manager

Subject: Report of a Geotechnical Inventory
SR 9/I-95 CDC for Broward and Palm Beach Counties
Florida Department of Transportation, District 4
Financial Project ID: 433108-1-32-01 and 433109-1-32-01
Broward and Palm Beach Counties, Florida
HRES Project No. HR12-891R

Dear Silvia:

HR Engineering Services, Inc. (HRES) is presenting this Report of a Geotechnical Inventory for the subject Study. This report summarizes all available geotechnical field exploration data provided to us.

We have enjoyed assisting you on this project and look forward to serving as your geotechnical consultant on the remainder of this project and on future projects. If you have any questions concerning this report, please call our office at (305) 888-8880.

Sincerely,

HR ENGINEERING SERVICES, INC.

Rodrigo A. Alba, E.I.
Staff Geotechnical Engineer

HERNANDO R. RAMOS LICENSE No. 42045 STATE OF FLORIDA PROFESSIONAL ENGINEER

Hernando R. Ramos, P.E.
Principal Geotechnical Engineer
Florida Registration 42045

10/1/13

Distribution: Addressee (3)
File (1)

TABLE OF CONTENTS

1.0 INTRODUCTION

The primary purpose of this study was to generate an inventory of the existing subsurface soil information available from previous projects performed along the proposed project alignment. The following is a summary of the available subsurface information.

Available Subsurface Information

- I-95, from North of Oakland Park Boulevard to South of Glades Road, report prepared by GCME, dated October 26, 2012:
  - Thirty two (32) standard penetration test structural borings.
  - Two hundred nineteen (219) auger borings.
  - Three constant head percolation tests.

- I-95, from Glades Road to Yamato Road, report prepared by Radise International (Radise), dated August 1 and 11, 2011:
  - Forty four (44) standard penetration test structural borings.
  - One hundred fifty eight (158) auger borings.

- I-95, from Stirling Road to North of Oakland Park Boulevard, report prepared by HR Engineering Services (HRES), dated May 29, 2012:
  - Eighteen (18) constant head percolation tests.
  - Fifteen (15) double ring infiltrometer tests.

- I-595 Corridor Design Consultant, report prepared by GCME, dated November 30, 2006:
  - Thirteen (13) constant head percolation tests.

- I-595 Corridor Improvements, report prepared by Mactec Engineering and Consulting, Inc. (Mactec), dated August 12, 2010:
  - One hundred nine (109) standard penetration test borings for mast arms, highmast light and overhead sign structures.

- I-595 Corridor Improvements, report prepared by Mactec, dated April 16, 2010:
  - Three hundred eighty six (386) standard penetration test structural borings for embankments.
  - Four hundred eighty nine (489) auger borings for roadway.

2.0 PROJECT INFORMATION

2.1 GENERAL

Project information has been provided to us by various members of the design team. Additional information has been provided during telephone conversations.

During our geotechnical study, we have been furnished with the following project-related geotechnical reports:

- Geotechnical Report – Roadway Soils Survey and Bridge Structures
  PD&E Study for SR-9/I-95, From North of Oakland Park Boulevard to South of Glades Road
  Prepared by: GCME
  Dated: October 26, 2012

- Geotechnical Engineering Services Report – Roadway
  Additional Auxiliary Lanes on I-95 Glades Road to Yamato Road
  Prepared by: Radise International, LC
  Dated: August 1, 2011

- Geotechnical Engineering Services Report – Structures
  Additional Auxiliary Lanes on I-95 Glades Road to Yamato Road
  Prepared by: Radise International, LC
  Dated: August 11, 2011

- Report of a Preliminary Geotechnical Exploration – Percolation and Double Ring Infiltrometer Test Results
  PD&E Study for I-95, From Stirling Road to North of Oakland Park Boulevard
  Prepared by: HR Engineering Services, Inc
  Dated: May 29, 2012

- Borehole Permeability Test Results Report
  I-595 Corridor Design Consultant
  Prepared by: GCME
  Dated: November 30, 2006

- Geotechnical Report – Mast Arms, Highmast Lights and Overhead Sign Structures
  I-595 Corridor Improvements
  Prepared by: Mactec Engineering and Consulting, Inc
  Dated: August 12, 2010

- Report of Geotechnical Exploration – Roadway and Embankments
  I-595 Corridor Improvements
  Prepared by: Mactec Engineering and Consulting, Inc
  Dated: April 16, 2010

2.2 PROJECT DESCRIPTION

The project consists of the improvement of SR 9/I-95, From the Interchange of SR 9/I-95 with I-595 (Broward County) to north of Linton Boulevard (Palm Beach County), Florida. The conceptual work may consist of the replacement or widening of existing bridge structures, construction of new retaining walls, sign structures, connector ramps, roadway widening, drainage improvement, and milling and resurfacing.

2.3 DETAILED FIELD DATA

The borings presented below were performed for bridge structures and along the existing roadway embankments. The available subsurface information can be detailed as follows:

Bridges

- Performed seventy six (76) structural borings at the following bridge structures:
  - I-95 Bridge over NW 38th Street (B-101 and B-102).
  - I-95 Bridge over Powerline Road (B-201 and B-202).
  - I-95 Bridge over Prospect Road (B-301 and B-302).
  - I-95 Bridge over Commercial Boulevard (B-401 and B-402).
  - I-95 Bridge over Cypress Creek Road (B-501 and B-502).
  - I-95 Bridge over Cypress Creek Canal (B-601 and B-602).
  - I-95 Bridge over Mac Nab Road (B-701 and B-702).
  - I-95 Bridge over Atlantic Boulevard (B-801 and B-802).
  - I-95 Bridge over Hammondville Road (B-901 and B-902).
  - I-95 Bridge over NW 15th Street (B-1001 and B-1002).
  - I-95 Bridge over Copans Road (B-1101 and B-1102).
  - I-95 Bridge over Sample Road (B-1201 and B-1202).
  - I-95 Bridge over Hillsboro Boulevard (B-1301 and B-1302).
  - I-95 Bridge over Hillsboro Canal (B-1401 and B-1402).
  - I-95 Bridge over Camino Real (B-1501 and B-1502).
  - I-95 Bridge over Palmetto Park Road (B-1601 and B-1602).
  - Glades Road Bridge over Military Trail (GL-TB-1 thru GL-TB-4).

- Glades Road Bridge over I-95 (GL-TB-5 thru GL-TB-10).
- Spanish River Bridge over I-95 (SP-TB-1 thru SP-TB-6).
- I-95 Bridge over Yamato Road (YA-TB-1 thru YA-TB-4).
- Spanish River Boulevard Bridge over El Rio Canal (SP-EL-TB-1 thru SP-EL-TB-4).
- Ramp I-95 NB EN over El Rio Canal (I-95 NB-EL-TB-1 and I-95 NB-EL-TB-2).
- Ramp YEB EN over El Rio Canal (RAMP YEB EN-TB-1 and RAMP YEB EN-TB-2).
- I-95 Bridge over El Rio Canal (I-95-EL-TB-1 thru I-95-EL-TB-4).
- Ramp FSB EN over El Rio Canal (FSBEN-TB-1 and FSBEN-TB-2).
- I-95 SB EN Ramp Bridge over El Rio Canal (I-95-SBEN-TB-1 and I-95-SBEN-TB-2).
- Yamato Road Bridge over El Rio Canal (YA-EL-TB-1 thru YA-EL-TB-4).
- Ramp FNB EX over I-95 and FECRR (FNB-EX-I-95-TB-1 thru FNB-EX-I-95-TB-3).
- Ramp I-95 SB EN over Ramp FSBEN (I-95-SBEN-FSBEN-TB-1 and I-95-SBEN-FSBEN-TB-2).
- Ramp I-95 SB EN over Yamato Road (I-95-SBEN-YA-TB-1 and I-95-SBEN-YA-TB-2).
- Ramp FSB EN over I-95 and FECRR (FSBEN-I-95-TB-1 thru FSBEN-I-95-TB-3).
- Ramp Loop WB EN over Yamato Road (WBEN-YA-TB-1 and WBEN-YA-TB-2).
- Ramp I-95 NB EN over Ramp YEB EN (I-95NB EN –YEB EN TB-1 and I-95NB EN – YEB EN TB-2).

Miscellaneous Structures

- One hundred nine (109) structural borings along the I-595 Corridor Improvements project for mast arms, highmast lights and overhead sign structures.

Roadway Embankments

- Three hundred eighty six (386) standard penetration test borings along the I-595 Corridor Improvements project for the proposed embankments.

Roadway Improvements

- Two hundred nineteen (219) auger borings along the project spaced approximately 500 feet from north of Oakland Park Boulevard to south of Glades Road.

- One hundred fifty eight (158) auger borings along the project I-95, from Glades Road to Yamato Road.

- Four hundred eighty nine (489) auger borings for I-595 Corridor Improvements project for the proposed roadway.

Drainage

- Eighteen (18) constant head percolation tests and fifteen (15) double ring infiltrometer tests along the project, from Stirling Road to North of Oakland Park Boulevard.

- Thirteen (13) constant head percolation tests along the I-595 Corridor.

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HR ENGINEERING SERVICES, INC.
Hernando R. Ramos
P.E. License No. 42045
7815 NW 72nd Avenue Medley, Florida 33166
Phone: (305) 888-8880 - Fax: (305) 888-8770
Certificate of Authorization No. 7991

DRAWN BY:	ME 10-13
CHECKED BY:	RAC 10-13
DESIGNED BY:	RAC 10-13
CHECKED BY:	HRR 10-13

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	433108-1-32-01
	PALM BEACH	433109-1-32-01

SHEET TITLE: KEY PLANS A-4

PROJECT NAME: I-95 CDC FOR BROWARD AND PALM BEACH COUNTIES

REF. DWG. NO.

SHEET NO.

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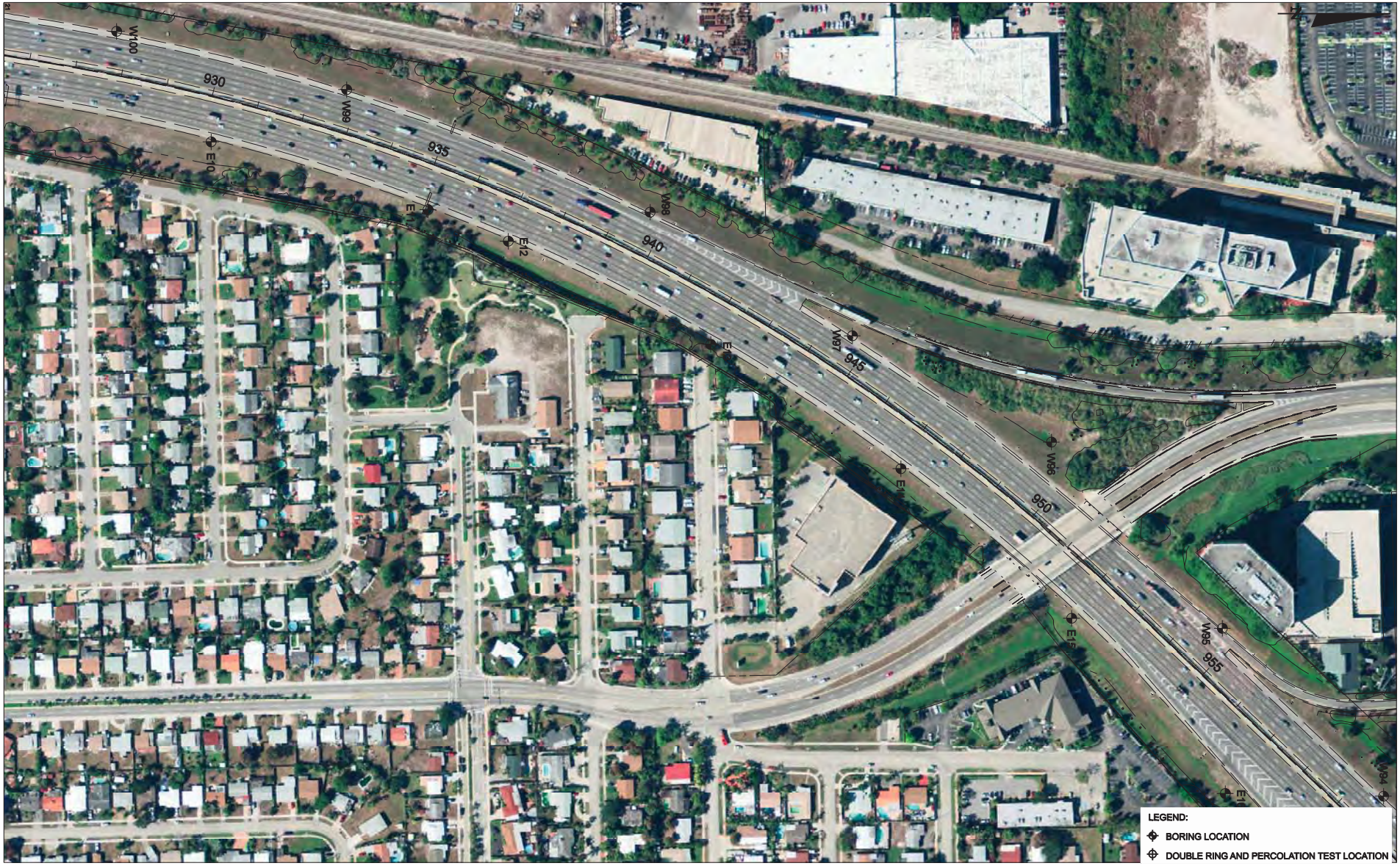

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	433108-1-32-01
	PALM BEACH	433109-1-32-01

SHEET TITLE: FIELD EXPLORATION PLANS A-36

REF. DWG. NO.

PROJECT NAME: I-95 CDC FOR BROWARD AND PALM BEACH COUNTIES

SHEET NO.

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CHECKED BY: HRR 10-13

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	433108-1-32-01
	PALM BEACH	433109-1-32-01

SHEET TITLE: FIELD EXPLORATION PLANS A-37

PROJECT NAME: I-95 CDC FOR BROWARD AND PALM BEACH COUNTIES

REF. DWG. NO.

SHEET NO.

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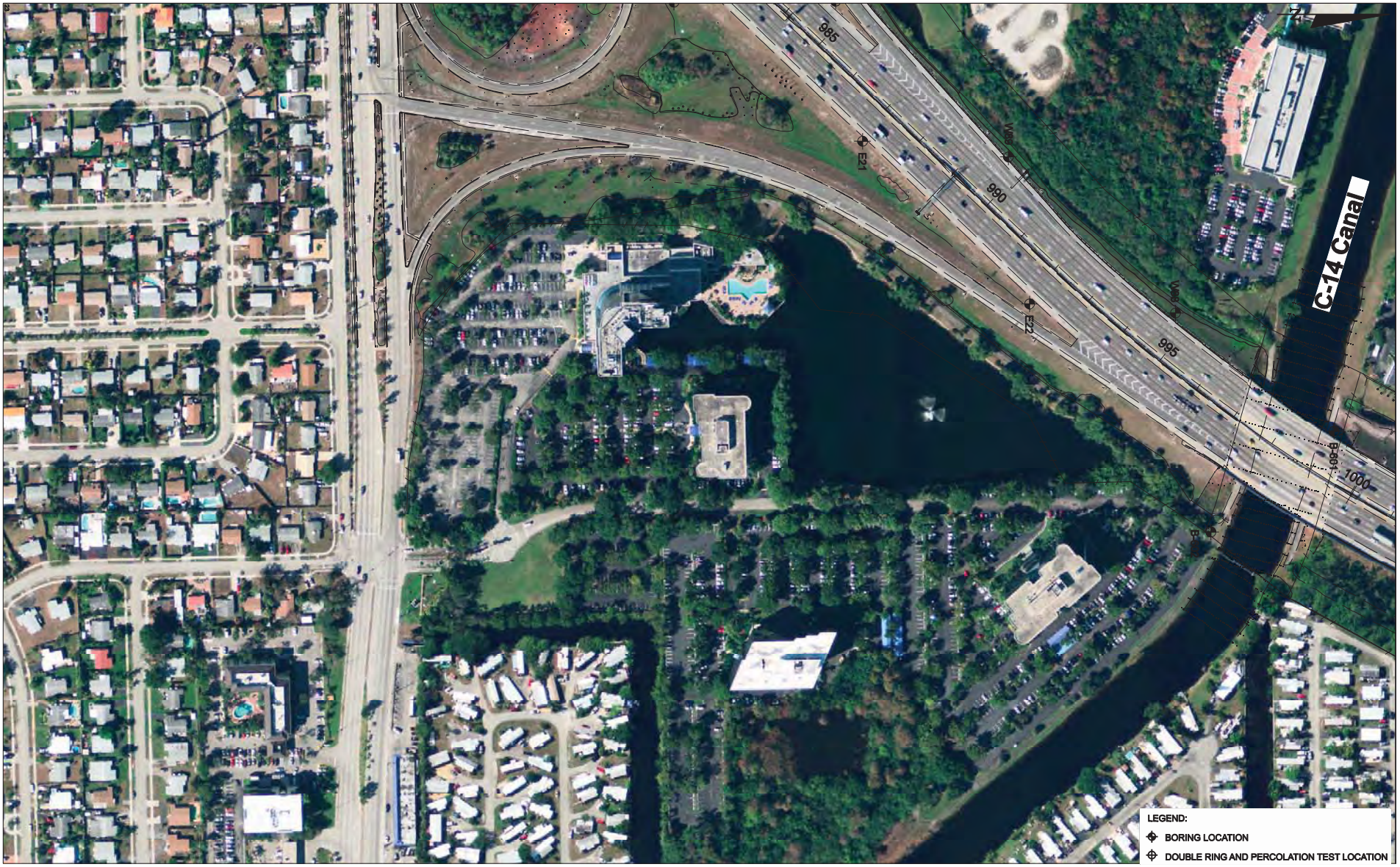

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HR ENGINEERING SERVICES, INC.
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DRAWN BY: ME 10-13
CHECKED BY: RAC 10-13
DESIGNED BY: RAC 10-13
CHECKED BY: HRR 10-13

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	433108-1-32-01
	PALM BEACH	433109-1-32-01

SHEET TITLE: FIELD EXPLORATION PLANS A-38

REF. DWG. NO.:

PROJECT NAME: I-95 CDC FOR BROWARD AND PALM BEACH COUNTIES

SHEET NO.:

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SUMMARY OF TEST BORING LOCATIONS
I-95 CDC FOR BROWARD AND PALM BEACH COUNTIES
FLORIDA DEPARTMENT OF TRANSPORTATION, DISTRICT 4
FINANCIAL PROJECT ID Nos. 433108-1-32-01 AND 433109-1-32-01
BROWARD AND PALM BEACH COUNTIES, FLORIDA
HR ENGINEERING SERVICES, INC.
HRES PROJECT No. HR12-891R
OCTOBER 1, 2013

TEST No.	PLANE COORDINATES		STATION	OFFSET, ft	BOREHOLE DEPTH, ft	BASELINE	REPORT PERFORMED BY	FPID No.
	NORTHING	EASTING						
BHP-401	675150.400	934088.400	908+10	185.0 L	10.0	I-95	GCME ROADWAY	409359-1-22-01 & 409355-1-22-01
BHP-402	674950.800	934454.100	906+40	195.0 R	10.0	I-95	GCME ROADWAY	409359-1-22-01 & 409355-1-22-01
BHP-501	680721.600	936784.700	971+40	135.0 L	10.0	I-95	GCME ROADWAY	409359-1-22-01 & 409355-1-22-01
BHP-502	680520.900	936968.200	971+20	135.0 R	10.0	I-95	GCME ROADWAY	409359-1-22-01 & 409355-1-22-01
BHP-801	690834.300	939085.700	1081+80	160.0 L	11.0	I-95	GCME ROADWAY	409359-1-22-01 & 409355-1-22-01
BHP-802	690735.200	939359.600	1080+80	110.0 R	11.0	I-95	GCME ROADWAY	409359-1-22-01 & 409355-1-22-01
BHP-1101	701444.100	940198.600	1190+50	120.0 L	10.0	I-95	GCME ROADWAY	409359-1-22-01 & 409355-1-22-01
BHP-1102	701242.800	940291.000	1189+50	80.0 R	10.0	I-95	GCME ROADWAY	409359-1-22-01 & 409355-1-22-01
BHP-1201	706711.700	942712.300	1251+85	160.0 L	10.0	I-95	GCME ROADWAY	409359-1-22-01 & 409355-1-22-01
BHP-1202	706411.300	943078.400	1248+75	205.0 R	10.0	I-95	GCME ROADWAY	409359-1-22-01 & 409355-1-22-01
BHP-1300A-1	717326.000	944460.700	1359+80	120.0 L	10.0	I-95	GCME ROADWAY	409359-1-22-01 & 409355-1-22-01
BHP-1300A-2	717529.800	944732.400	1362+45	95.0 R	10.0	I-95	GCME ROADWAY	409359-1-22-01 & 409355-1-22-01
BHP-1301	722482.400	945426.600	1412+90	225.0 L	10.0	I-95	GCME ROADWAY	409359-1-22-01 & 409355-1-22-01
BHP-1302	722182.000	945792.600	1409+95	150.0 R	10.0	I-95	GCME ROADWAY	409359-1-22-01 & 409355-1-22-01
BHP-1601	734292.400	944800.000	184+55	205.0 L	10.0	I-95	GCME ROADWAY	409359-1-22-01 & 409355-1-22-01
BHP-1602	733992.600	945256.900	181+50	255.0 R	10.0	I-95	GCME ROADWAY	409359-1-22-01 & 409355-1-22-01
I-95-N-AB-2	734552.200	945077.700	187+00	85.0 R	10.0	I-95	RADISE ROADWAY	412420-2-52-01
I-95-N-AB-4	735068.000	945014.600	192+15	80.0 R	5.0	I-95	RADISE ROADWAY	412420-2-52-01
I-95-N-AB-6	735577.900	944931.700	197+20	100.0 R	5.0	I-95	RADISE ROADWAY	412420-2-52-01
I-95-N-AB-8	736037.977	944785.274	202+00	85.0 R	5.0	I-95	RADISE ROADWAY	412420-2-52-01
I-95-N-AB-10	736516.898	944641.593	207+00	90.0 R	5.0	I-95	RADISE ROADWAY	412420-2-52-01
I-95-N-AB-12	736993.941	944528.279	212+00	95.0 R	10.0	I-95	RADISE ROADWAY	412420-2-52-01
I-95-N-AB-14	737499.845	944450.612	217+20	90.0 R	5.0	I-95	RADISE ROADWAY	412420-2-52-01
I-95-N-AB-16	737970.814	944421.764	222+00	90.0 R	5.0	I-95	RADISE ROADWAY	412420-2-52-01
I-95-N-AB-18	738462.630	944436.724	227+00	90.0 R	5.0	I-95	RADISE ROADWAY	412420-2-52-01
I-95-N-AB-20	738969.709	944505.538	232+20	105.0 R	5.0	I-95	RADISE ROADWAY	412420-2-52-01
I-95-N-AB-22	739445.967	944591.770	237+15	90.0 R	10.0	I-95	RADISE ROADWAY	412420-2-52-01
I-95-N-AB-24	739921.777	944714.722	242+10	80.0 R	5.0	I-95	RADISE ROADWAY	412420-2-52-01

APPENDIX E

(Excerpts from Previous Projects)

E1-5: Drainage Report from FPID 433108-4-52-01

E6-22: Drainage Report from FPID 433108-4-52-01

E23-31: Drainage Plan from FPID 433108-4-52-01

FORM #0157
Rev. 07/09

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
ENVIRONMENTAL RESOURCE
PERMIT MODIFICATION NO. 06-01465-S
DATE ISSUED: DECEMBER 15, 2014

PERMITTEE: FLORIDA DEPARTMENT OF TRANSPORTATION
(I-95 EXPRESS LANES PHASE 3A)
3400 W COMMERCIAL BLVD,
FORT LAUDERDALE, FL 33309

ORIGINAL PERMIT ISSUED: NOVEMBER 15, 1990

ORIGINAL PROJECT DESCRIPTION: CONSTRUCTION AND OPERATION OF A SURFACE WATER MANAGEMENT SYSTEM SERVING 40 ACRES OF A ROADWAY PROJECT KNOWN AS I-95 FROM SOUTH OF BROWARD BLVD TO 6TH STREET.

APPROVED MODIFICATION: MODIFICATION FOR THE CONCEPTUAL APPROVAL OF A 993.78 ACRE ROADWAY PROJECT KNOWN AS I-95 EXPRESS LANES PHASE 3A.(NO CONSTRUCTION IS AUTHORIZED BY THIS PERMIT.)

PROJECT LOCATION: BROWARD COUNTY , SECTION 2,10,11,15,21,22,28,33 TWP 49S RGE 42E
SECTION 4,9,16,17 TWP 50S RGE 42E
SECTION 34,35 TWP 48S RGE 42E

PERMIT DURATION: See Special Condition No:1.

This is to notify you of the District's agency action concerning Permit Application No. 140516-1, dated May 15, 2014. This action is taken pursuant to the provisions of Chapter 373, Part IV, Florida Statutes (F.S.).

Based on the information provided, District rules have been adhered to and an Environmental Resource Permit Modification is in effect for this project subject to:

1. Not receiving a filed request for an administrative hearing pursuant to Section 120.57 and Section 120.569, or request a judicial review pursuant Section 120.68, Florida Statutes.
2. The attached 18 General Conditions.
3. The attached 9 Special Conditions.
4. The attached 5 Exhibits.

Should you object to these conditions, please refer to the attached "Notice of Rights" which addresses the procedures to be followed if you desire a public hearing or other review of the proposed agency action. Should you wish to object to the proposed agency action or file a petition, please provide written objections, petitions and/or waivers to:

Office of the District Clerk
South Florida Water Management District
Post Office Box 24680
West Palm Beach, FL 33416-4680
e-mail: clerk@sfwmd.gov

Please contact this office if you have any questions concerning this matter. If we do not hear from you in accordance with the "Notice of Rights", we will assume that you concur with the District's action.

CERTIFICATION OF SERVICE

I HEREBY CERTIFY THAT this written notice has been mailed or electronically submitted to the Permittee (and the persons listed on the attached distribution list) this 16th day of December, 2014, in accordance with Section 120.60(3), F.S. Notice was also electronically posted on this date through a link on the home page of the District's website (my.sfwmd.gov/ePermitting).

By _____
DEPUTY CLERK
SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Attachments

SPECIAL CONDITIONS

1. The conceptual phase of this permit shall expire on December 15, 2034.

2. Operation of the stormwater management system shall be the responsibility of PERMITTEE.

3. Discharge Facilities: See Exhbit 2 (Plans) and Exhibit 3 (Summary Table)

4. A stable, permanent and accessible elevation reference shall be established on or within one hundred (100) feet of all permitted discharge structures no later than the submission of the certification report. The location of the elevation reference must be noted on or with the certification report.

5. Reference is made to Exhibit Numbers 2A, 2B, 2C, and 2D consisting of typical sections and roadway plan sheets, pond details and drainage details, cross sections and project survey control sheets, and erosion control plan sheets. The drawings have been signed and sealed by a registered professional and have been incorporated in this permit by reference (please see permit file).

6. In accordance with the work schedule, the permittee shall submit verification from the Florida Department of Environmental Protection (FDEP) that 0.04 freshwater forested mitigation credit has been debited from the Loxahatchee Mitigation Bank ledger as mitigation for this impact.

7. The permittee shall comply with the following conditions intended to protect manatees and marine turtles from direct project effects:

   a. All personnel associated with the project shall be instructed about the presence of marine turtles, manatees and manatee speed zones, and the need to avoid collisions with and injuries to manatees. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.

   b. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

   c. Siltation or turbidity barriers shall be made of material in which manatees and marine turtles cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee and marine turtle entanglement or entrapment. Barriers must not impede manatee movement.

   d. All on-site project personnel are responsible for observing water-related activities for the presence of marine turtles and manatee(s). All in-water operations, including vessels, must be shutdown if a marine turtle or manatee(s) comes within 50 feet of the operation. Activities will not resume until the animal(s) have moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the animal(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

   e. Any collision with or injury to a marine turtle or manatee shall be reported immediately to the FWC Hotline at 1-888-404-3922. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Jacksonville (1-904-731-3336) for north Florida or Vero Beach (1-772-562-3909) for south Florida, and to FWC at ImperiledSpecies@myFWC.com.

   f. Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Awareness signs that have already been approved for this use by the Florida Fish and Wildlife Conservation Commission (FWC) must be used. One sign measuring at least 3 ft. by 4 ft. which reads Caution: Manatee Area must be posted. A second sign measuring at least 81/2" by 11" explaining the requirements for "Idle Speed/No Wake" and the shut down of in-water operations must be posted in a

FINAL APPROVED BY EXECUTIVE DIRECTOR DECEMBER 15, 2014

Last Date For Agency Action: December 23, 2014

INDIVIDUAL ENVIRONMENTAL RESOURCE PERMIT STAFF REPORT

Project Name: I-95 Express Lanes Phase 3a

Permit No.: 06-01465-S

Application No.: 140516-1 **Associated File:** 141028-5 ERP Concurrent

Application Type: Environmental Resource (Conceptual Approval Modification)

Location: Broward County, S4,9,16,17/T50S/R42E
S2,10,11,15,21,22,28,33/T49S/R42E
S34,35/T48S/R42E

Permittee : Florida Department Of Transportation

Operating Entity : Permittee

Project Area: 993.78 acres

Permit Area: 993.78 acres

Project Land Use: Highway

Receiving Body: C-13, C-14, and North and South Fork of the New River **Class:** CLASS III

Special Drainage District: NA

Total Acres Wetland Onsite:	.28	
Total Acres Impacted Onsite :	.28	
Offsite Mitigation Credits-Mit.Bank:	.04	Loxahatchee Mitigation Bank
Conservation Easement To District :	No	
Sovereign Submerged Lands:	No	

PROJECT PURPOSE:

This application is a request for modification of an Environmental Resource Permit to authorize the conceptual approval of a 993.78 acre roadway project known as I-95 Express Lanes Phase 3A.

PROJECT EVALUATION:

PROJECT SITE DESCRIPTION:

The project extends from south of Broward Boulevard to SW 10th Street in Broward County. This project traverses the cities of Fort Lauderdale, Oakland Park, Pompano Beach, and Deerfield Beach.

PROPOSED PROJECT:

This application is a request for modification of Environmental Resource Permit Number 06-01465-S to authorize the conceptual approval of a 993.78 acre roadway project known as I-95 Express Lanes Phase 3A. The I-95 Express Lanes 3A project will convert the existing high occupancy vehicle (HOV) lanes to high occupancy toll (HOT) lanes, and include widening to accommodate the addition of a second HOT lane in each direction. New auxiliary lanes will be provided along I-95 northbound and southbound between Oakland Park Boulevard and Commercial Boulevard. The proposed stormwater management system will include detention ponds within the existing major interchanges, in conjunction with linear dry detention swales along the outside of the roadway and exfiltration trench. The dry detention swales and ponds will be interconnected and provide water quality treatment and attenuation prior to discharge into the South Fork of the New River, North Fork of the New River, C-13 Canal, and C-14 Canal. A summary table addressing existing and proposed water quality treatment, design storm elevations and discharges, and control structure description is attached as Exhibit 3.

LAND USE:

Construction Project:

	Total Project	
Impervious	542.76	acres
Pervious	427.93	acres
Wet Detention	23.09	acres
Total:	**993.78**	

WATER QUANTITY :

Discharge Rate :

The engineer has submitted calculations to demonstrate that post-development discharge for the 25-year, 3-day design event will be less than existing conditions.

Road Design :

As shown in the conceptual plans (Exhibits 2A-D) and the Summary Table (Exhibit 3) minimum road center lines have been set at or above the calculated design storm flood elevations.

Control Elevation :

Basin	Area (Acres)	Ctrl Elev (ft, NAVD 88)	WSWT Ctrl Elev (ft, NAVD 88)	Method Of Determination
Site	993.78	.42	.42	Adjacent Canal Control Elevation

WATER QUALITY :

Water quality treatment will be provided within dry and wet detention and exfiltration trench (see Exhibit 3, Summary Table). To maintain water quality standards, the applicant proposes to utilize best management practices during all roadway construction activities and to monitor water quality during construction within local canals per Exhibit 2.

WETLANDS:

Three different wetland types are present within the I-95 Express Lanes Phase 3A corridor. These include mangrove shoreline wetlands, submerged tape grass resources, and freshwater forested wetlands (Exhibit 3). Each of these wetland habitats has been degraded as a result of the close proximity of local transportation corridors (boat/train/automobile). Due to the engineering constraints associated with the design of the I-95 Express Lanes and the associated bridge improvements, opportunities for reduction and elimination of wetland impacts were limited.

Mangrove Shoreline Wetlands

The total acreage of mangrove shoreline wetlands within the project is 0.27 acre. These wetlands are narrow, discontinuous fringes of small trees growing at the shoreline interface. The mangroves are currently being outcompeted by invasive exotic species including tropical almond (Terminalia cattapa), Brazilian pepper (Schinus terebinthifolius) and seaside mahoe (Thespesia polpunea).

The total acreage of direct impacts to mangrove shorelines is 0.14 acre. Given the proximity of the existing highway to these wetlands, secondary impacts were calculated to extend 25' beyond bridge construction direct impacts. The resulting acreage of secondary impacts was determined to be 0.07 acre.

Submerged Tape Grass Wetlands

The shallow areas on the north and south banks of the South Fork of the Middle River (C-13 Canal) and the C-14 Canal contain tape grass (Vallisneria americana). The total acreage of areas containing tape grass is 0.09 acres. Direct impacts to tape grass areas will result from the widening of bridges and the installation of shoreline stabilization measures. The total acreage of direct impacts to submerged tape grass resources is 0.08 acre. Based on field reviews, the north-south orientation of the bridges allows sufficient sunlight to reach the bottom of the canal/water bodies and allows tape grass to grow to the outer edges of the bridge. Therefore, no secondary impacts due to shading were assessed.

Forested Freshwater Wetlands

Wetland 38 is a freshwater forested wetland located north of Sunrise Boulevard. It is proposed to be partially impacted by roadway improvements. Wetland trees including cypress (Taxodium distichum), red maple (Acer rubrum), and dahoon holly (Ilex cassine) are present with an herbaceous understory dominated by various native ferns. There are 0.06 acres of direct impacts proposed to this jurisdictional area. Given the proximity of the existing highway to these wetlands, secondary impacts were calculated to extend 25' beyond direct impacts. The acreage of resulting secondary impacts was calculated as 0.16 acre.

95 EXPRESS

95 EXPRESS PHASE 3A

Broward County

From South of Broward Boulevard to Atlantic Boulevard

Excerpts from SFWMD Permit 06-01465-S, Application 140516-1

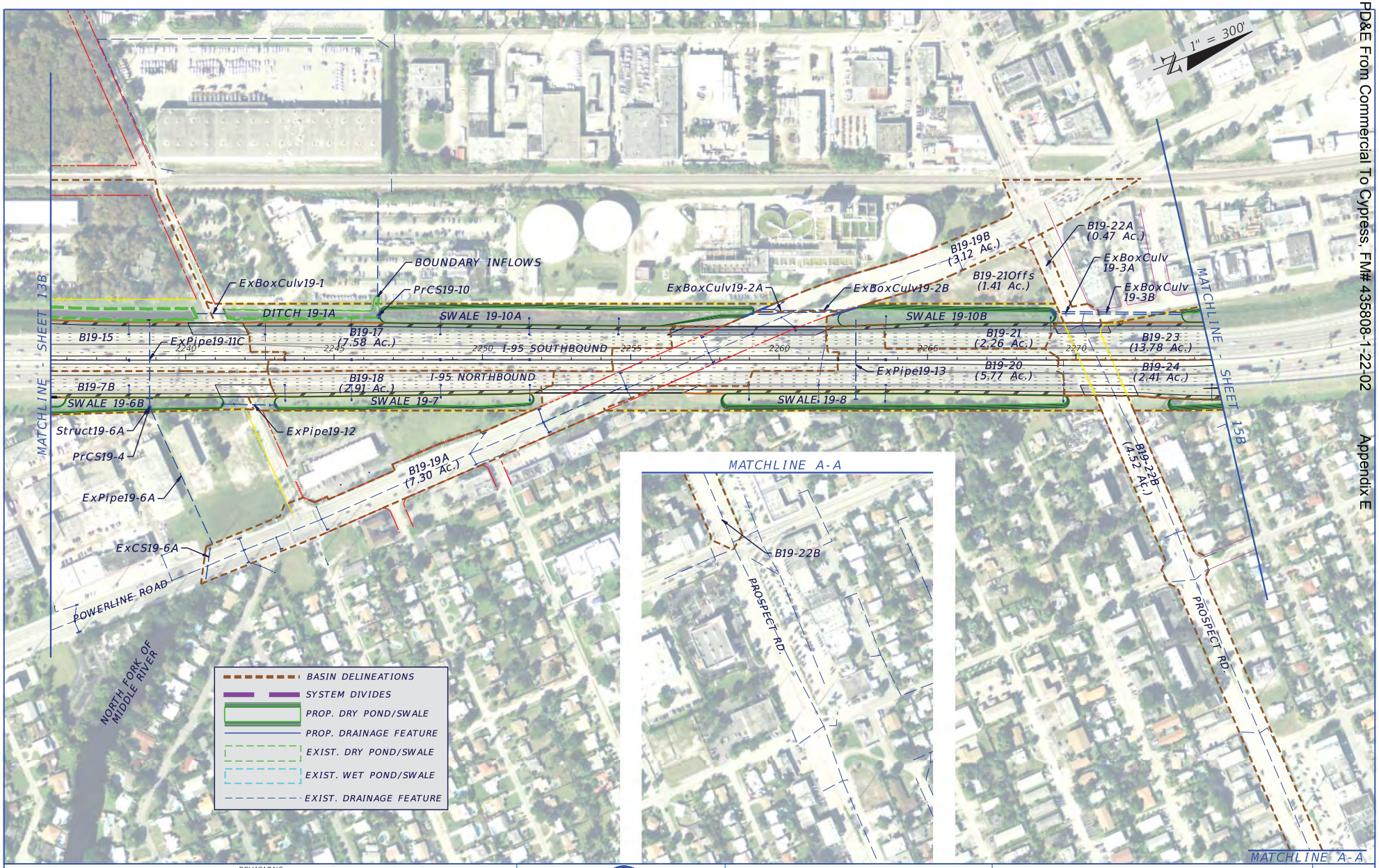
Conceptual Drainage Report

April 2014

Prepared for:
Florida Department of Transportation – District Four (D4)

Prepared by:
RS&H, Inc.

FDOT



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

95 EXPRESS

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	433108-4-52-01

POST-DEVELOPMENT DRAINAGE MAP

SHEET NO. 14B

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REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

95 EXPRESS

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	433108-4-52-01

POST-DEVELOPMENT DRAINAGE MAP

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REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

95 EXPRESS

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	433108-4-52-01

POST-DEVELOPMENT DRAINAGE MAP

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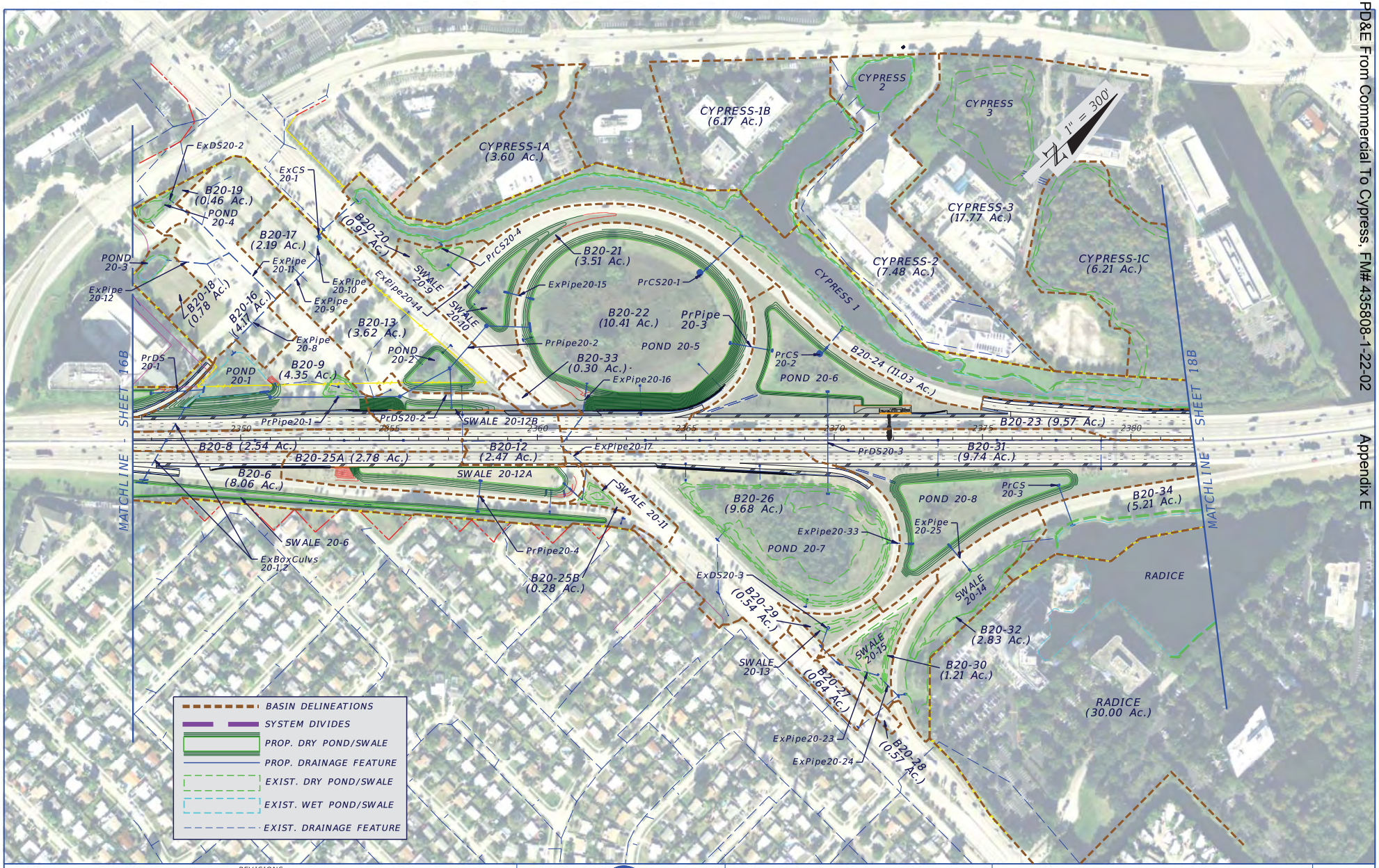

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

95 EXPRESS

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	433108-4-52-01

POST-DEVELOPMENT DRAINAGE MAP

SHEET NO. 17B

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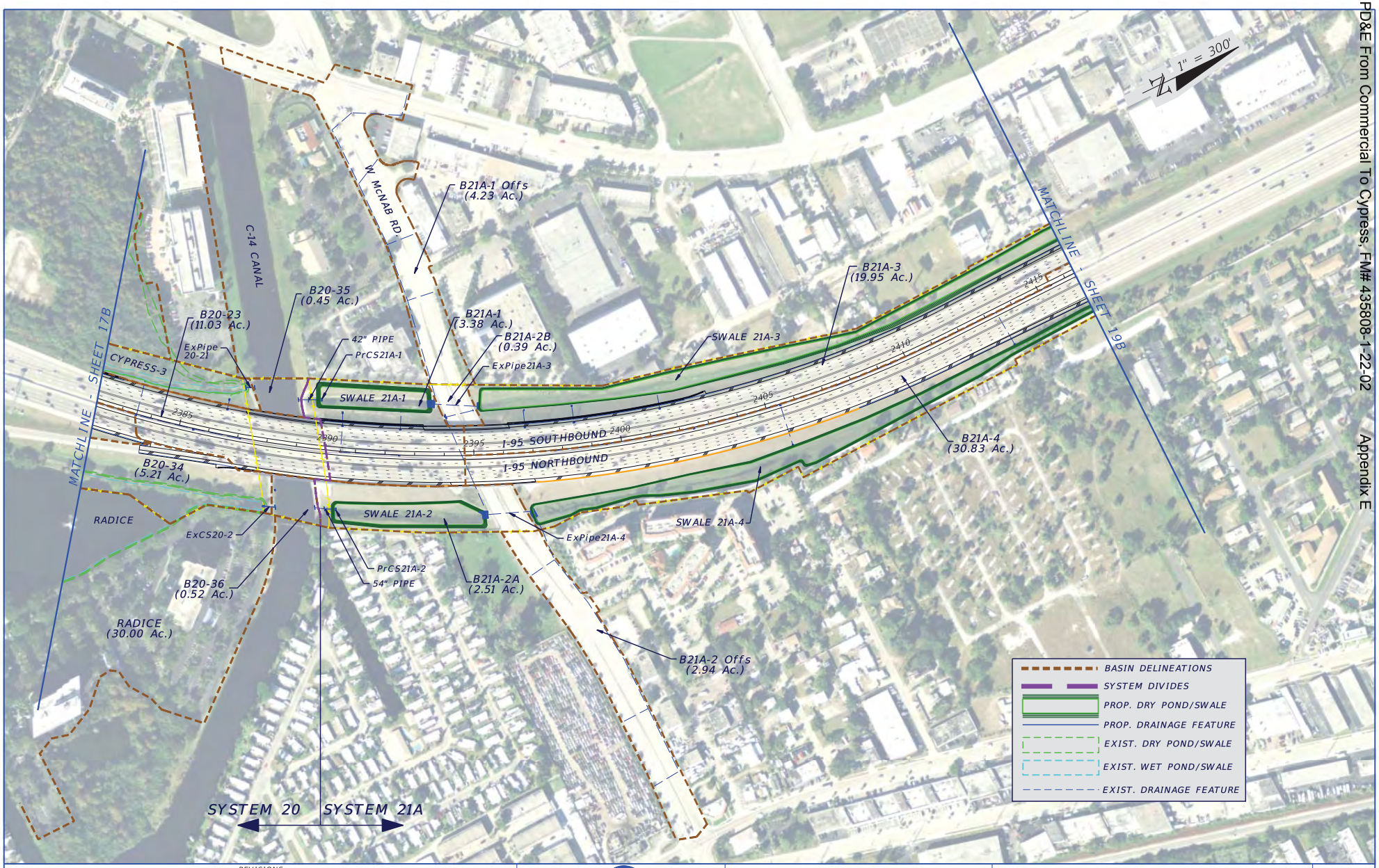

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

95 EXPRESS

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	433108-4-52-01

POST-DEVELOPMENT DRAINAGE MAP

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Appendix J

System 19

- Land-Use Tables
- Drainage Calculations
- Summary Tables
- ICPR: Pre-Development
- ICPR: Post-Development

I-95 CDC DRAINAGE CALCULATIONS

POST-DEVELOPMENT LAND-USE

DRAINAGE SYSTEM: 19 **SHGWT EL. (ft-NAVD):** 0.42

SYSTEM	BASIN	Time of Conc. t_c (min.)	TOTAL AREA (Ac.)	TOTAL ONSITE AREA (Ac.)	ONSITE IMPERVIOUS AREA (Ac.)	ONSITE WATER SURFACE AREA (Ac.)	ONSITE PERVIOUS AREA (Ac.)	TOTAL OFFSITE AREA (Ac.)	OFFSITE IMPERVIOUS AREA (Ac.)	OFFSITE WATER SURFACE AREA (Ac.)	OFFSITE PERVIOUS AREA (Ac.)	AVERAGE GROUND ELEV. (ft-NAVD)	AVERAGE DEPTH TO SHGWT (ft)	COMPACTED SOIL STORAGE (in)	CURVE NUMBER
19A	B19-2A	10	2.65	2.65	1.74	0.00	0.91	0.00	0.00	0.00	0.00	13.00	13.00	8.18	78.15
	SYSTEM 19A TOTALS:		2.65	2.65	1.74	0.00	0.91	0.00	0.00	0.00	0.00	--	--	--	--
19B	B19-2B	10	7.45	7.45	5.86	0.00	1.59	0.00	0.00	0.00	0.00	13.00	13.00	8.18	85.14
	B19-3A	10	1.02	1.02	0.65	0.00	0.37	0.00	0.00	0.00	0.00	26.00	26.00	8.18	77.12
	B19-3B	10	0.39	0.39	0.26	0.00	0.13	0.00	0.00	0.00	0.00	8.00	8.00	8.18	78.58
	SYSTEM 19B TOTALS:		8.86	8.86	6.77	0.00	2.09	0.00	0.00	0.00	0.00	--	--	--	--
19D	B19-10	10	1.45	1.45	0.91	0.00	0.54	0.00	0.00	0.00	0.00	6.00	6.00	8.18	76.65
	SYSTEM 19D TOTALS:		1.45	1.45	0.91	0.00	0.54	0.00	0.00	0.00	0.00	--	--	--	--
19E	B19-17	10	7.58	7.58	4.74	0.00	2.84	0.00	0.00	0.00	0.00	28.00	28.00	8.18	76.54
	B19-19B	10	3.12	3.12	3.12	0.00	0.00	0.00	0.00	0.00	0.00	6.00	6.00	8.18	100.00
	B19-20	10	5.77	5.77	3.73	0.00	2.04	0.00	0.00	0.00	0.00	31.00	31.00	8.18	77.57
	B19-21	10	2.26	2.26	1.13	0.00	1.13	0.00	0.00	0.00	0.00	31.00	31.00	8.18	70.97
	B19-21 Offs	10	1.41	0.00	0.00	0.00	0.00	1.41	0.00	0.00	1.41	6.00	6.00	8.18	55.01
	B19-22A	10	0.47	0.47	0.47	0.00	0.00	0.00	0.00	0.00	0.00	7.50	7.00	8.18	100.00
	B19-22B	10	4.52	4.52	4.52	0.00	0.00	0.00	0.00	0.00	0.00	8.00	8.00	8.18	100.00
	B19-23	10	13.78	13.78	8.04	0.00	5.74	0.00	0.00	0.00	0.00	18.50	18.00	8.18	74.59
	B19-24	10	2.41	2.41	2.41	0.00	0.00	0.00	0.00	0.00	0.00	28.00	28.00	8.18	100.00
	B19-25	10	4.03	4.03	1.82	0.00	2.21	0.00	0.00	0.00	0.00	7.00	7.00	8.18	69.03
	B19-26	10	6.10	6.10	3.53	0.00	2.57	0.00	0.00	0.00	0.00	22.50	22.00	8.18	74.37
	B19-27A	10	0.98	0.98	0.58	0.00	0.40	0.00	0.00	0.00	0.00	27.00	27.00	8.18	74.97
	B19-27B	10	0.12	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	9.00	9.00	8.18	100.00
	B19-27C	10	0.17	0.17	0.17	0.00	0.00	0.00	0.00	0.00	0.00	30.50	30.00	8.18	100.00
	B19-28A	10	3.29	3.29	2.43	0.00	0.86	0.00	0.00	0.00	0.00	20.00	20.00	8.18	82.38
	B19-28B	10	0.15	0.15	0.15	0.00	0.00	0.00	0.00	0.00	0.00	30.00	30.00	8.18	100.00
	B19-29A	10	0.13	0.13	0.08	0.00	0.05	0.00	0.00	0.00	0.00	8.50	8.00	8.18	76.07
	B19-29B	10	0.48	0.48	0.43	0.00	0.05	0.00	0.00	0.00	0.00	8.00	8.00	8.18	92.15
	B19-29C	10	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	30.50	30.00	8.18	100.00
	B19-29D	10	0.30	0.30	0.30	0.00	0.00	0.00	0.00	0.00	0.00	9.00	9.00	8.18	100.00
	B19-30A	10	0.13	0.13	0.13	0.00	0.00	0.00	0.00	0.00	0.00	8.00	8.00	8.18	100.00
	B19-30B	10	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	31.00	31.00	8.18	100.00
	B19-30C	10	0.18	0.18	0.18	0.00	0.00	0.00	0.00	0.00	0.00	9.50	9.00	8.18	100.00
	B19-31	10	7.38	7.38	5.66	0.00	1.72	0.00	0.00	0.00	0.00	8.00	8.00	8.18	83.99
	B19-32A	10	0.12	0.12	0.07	0.00	0.05	0.00	0.00	0.00	0.00	7.50	7.00	8.18	74.58
	B19-32B	10	3.60	3.60	0.64	0.00	2.96	0.00	0.00	0.00	0.00	9.50	9.00	8.18	59.79
	B19-33A	10	0.16	0.16	0.12	0.00	0.04	0.00	0.00	0.00	0.00	8.00	8.00	8.18	83.02
	B19-33B	10	1.90	1.90	0.82	0.00	1.08	0.00	0.00	0.00	0.00	28.00	28.00	8.18	68.26
	B19-34	10	2.36	2.36	1.08	0.00	1.28	0.00	0.00	0.00	0.00	28.00	28.00	8.18	69.27
	B19-35	10	8.74	8.74	5.57	0.00	3.17	0.00	0.00	0.00	0.00	16.00	16.00	8.18	77.12
	B19-36	10	6.62	6.62	3.73	0.00	2.89	0.00	0.00	0.00	0.00	10.00	10.00	8.18	73.69
	B19-37	10	2.17	2.17	2.17	0.00	0.00	0.00	0.00	0.00	0.00	15.00	15.00	8.18	100.00
	SYSTEM 19E TOTALS:		90.49	89.08	58.00	0.00	31.08	1.41	0.00	0.00	1.41	--	--	--	--

These values were used to determine the existing surplus capacity in Systems C13-SCOM and C13-NCOM, and for treatment areas just south of the project area.

I-95 CDC DRAINAGE CALCULATIONS

Drainage System: ***19***

SYSTEM	SHGWT EL. (ft-NAVD)	TOTAL ONSITE AREA (Ac.) *[POST-DEV.]*	ONSITE IMPERVIOUS AREA (Ac.) *[POST-DEV.]*	ONSITE PERVIOUS AREA (Ac.) *[POST-DEV.]*	1" OVER TOTAL ONSITE AREA (Ac-ft)	2.5" OVER IMPERVIOUS AREA (Ac-ft)	[1]WATER QUALITY TREATMENT REQUIRED (Ac-ft)	DRY-DETENTION TREATMENT VOLUME PROVIDED (Ac-ft)	WET-DETENTION TREATMENT VOLUME PROVIDED (Ac-ft)	DRY- / WET-RETENTION TREATMENT VOLUME PROVIDED (Ac-ft)	FRENCH DRAIN TREATMENT VOLUME PROVIDED (Ac-ft)	[2]TOTAL TREATMENT VOLUME PROVIDED (Ac-ft)	[3]SURPLUS TREATMENT VOLUME PROVIDED (Ac-ft)
19A	0.42	2.65	1.74	0.91	0.22	0.36	**0.36**	0.27	0.00	0.00	0.00	**0.36**	**0.00**
19B	0.42	8.86	6.77	2.09	0.74	1.41	**1.41**	0.00	0.00	0.76	0.00	**1.52**	**0.11**
19D	0.42	1.45	0.91	0.54	0.12	0.19	**0.19**	0.18	0.00	0.00	0.00	**0.25**	**0.06**
19E	0.42	89.08	58.00	31.08	7.42	12.08	**12.08**	0.00	0.00	7.07	0.00	**14.13**	**2.05**
19F	0.42	45.98	23.62	14.07	3.83	4.92	**4.92**	0.00	0.00	18.09	0.00	**36.18**	**31.26**
19H	0.42	9.83	4.82	5.01	0.82	1.00	**1.00**	0.75	0.00	0.00	0.00	**1.00**	**0.00**
19J	0.42	13.18	5.70	7.48	1.10	1.19	**1.19**	1.77	0.00	0.00	0.00	**2.36**	**1.17**
SYSTEM TOTALS:		**171.03**	**101.56**	**61.18**	**14.25**	**21.16**	**21.16**	**2.98**	**0.00**	**25.92**	**0.00**	**55.80**	**34.64**

[1]Greater of 1" over Total Onsite Area and 2.5" over Onsite Impervious Area; Volume based on wet detention requirements.

[2]Sum of all treatment provided; Retention and Dry Detention volumes divided by 0.50 and 0.75, respectively to account for 50% and 25% credits.

[3]Water quality treatment provided for all onsite contributing basins with the exception of System 19G (7.43 acres) which is located downstream of existing/proposed control structures; water quality treatment provided for all offsite contributing basins (1.41 acres), as well as signficant compensatory treatment within System 19F which receives boundary flows.

SWALE 19-10A			**SWALE 19-10B**			**SWALE 19-10C**			**SWALE 19-1**			**SWALE 19-2**		
TYPE:	DRY RETENTION		**TYPE:**	DRY RETENTION		**TYPE:**	DRY RETENTION		**TYPE:**	DRY RETENTION		**TYPE:**	DRY DETENTION	
STAGE (ft-NAVD)	**AREA (Ac.)**	**VOLUME (Ac-ft)**	**STAGE (ft-NAVD)**	**AREA (Ac.)**	**VOLUME (Ac-ft)**	**STAGE (ft-NAVD)**	**AREA (Ac.)**	**VOLUME (Ac-ft)**	**STAGE (ft-NAVD)**	**AREA (Ac.)**	**VOLUME (Ac-ft)**	**STAGE (ft-NAVD)**	**AREA (Ac.)**	**VOLUME (Ac-ft)**
1.42	1.30	--	1.42	0.70	--	1.42	1.68	--	1.42	0.50	--	1.42	0.24	--
2.42	***1.41***	***1.35***	***2.42***	***0.75***	***0.72***	***2.42***	***1.95***	***1.81***	2.42	0.64	0.57	***2.42***	***0.31***	***0.27***
3.42	1.51	2.81	3.42	0.80	1.50	3.42	2.22	3.90	***2.70***	***0.68***	***0.76***	3.42	0.37	0.61
4.42	1.62	4.38	4.42	0.85	2.32	4.42	2.50	6.26	3.42	0.78	1.29	4.42	0.44	1.02
5.42	1.73	6.05	5.42	0.90	3.20	5.42	2.77	8.89	3.62	0.81	1.45			
			6.42	0.95	4.12				4.42	0.93	2.14			

SWALE 19-6A			**SWALE 19-7**			**SWALE 19-8**			**SWALE 19-9**			**SWALE 19-15**		
TYPE:	DRY DETENTION		**TYPE:**	DRY RETENTION		**TYPE:**	DRY RETENTION		**TYPE:**	DRY RETENTION		**TYPE:**	DRY RETENTION	
STAGE (ft-NAVD)	**AREA (Ac.)**	**VOLUME (Ac-ft)**	**STAGE (ft-NAVD)**	**AREA (Ac.)**	**VOLUME (Ac-ft)**	**STAGE (ft-NAVD)**	**AREA (Ac.)**	**VOLUME (Ac-ft)**	**STAGE (ft-NAVD)**	**AREA (Ac.)**	**VOLUME (Ac-ft)**	**STAGE (ft-NAVD)**	**AREA (Ac.)**	**VOLUME (Ac-ft)**
1.42	0.58	--	1.42	0.69	--	1.42	0.95	--	1.42	0.19	--	1.42	0.43	--
2.42	***0.71***	***0.64***	***1.90***	***0.7166***	***0.33***	***2.42***	***1.03***	***0.99***	***2.42***	***0.24***	***0.22***	***2.42***	***0.47***	***0.45***
3.42	0.83	1.41	2.42	0.75	1.05	3.42	1.12	2.07	3.42	0.30	0.49	3.42	0.51	0.94
			3.42	0.82	1.83	4.42	1.21	3.23	4.42	0.35	0.81	4.42	0.55	1.47
			4.42	0.88	2.68	5.42	1.30	4.48	5.42	0.41	1.20	5.42	0.59	2.04
						6.42	1.38	5.82						

The volume at the control structure elevation was used to determine the existing treatment volume in Systems C13-SCOM and C13-NCOM

SWALE 19-16			SWALE 19-17			SWALE 19-6B						POND 19-3		
TYPE:	DRY RETENTION		TYPE:	DRY RETENTION		TYPE:	DRY RETENTION					TYPE:	DRY DETENTION	
STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)				STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)
1.42	0.23	--	1.42	0.88	--	1.42	0.85	--				1.00	0.00	--
2.42	*0.35*	*0.29*	*2.42*	*1.07*	*0.97*	*1.90*	*0.9217*	*0.43*				1.50	0.03	0.01
3.42	0.66	0.80	3.42	1.26	2.14	2.42	1.00	0.92				2.00	0.16	0.05
4.42	0.83	1.55	4.42	1.46	3.50	3.42	1.14	1.99				2.50	0.20	0.14
5.42	1.01	2.47	5.42	1.65	5.05							*2.69*	*0.2126*	*0.18*
												3.00	0.23	0.25
												3.50	0.26	
SWALE 19-13														
TYPE:	DRY RETENTION		TYPE:			TYPE:			TYPE:			TYPE:		
STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)
1.42	0.24	--												
2.42	*0.28*	*0.26*												
3.42	0.32	0.56												
4.42	0.36	0.90												
5.42	0.41	1.28												
POND 19-1			POND 19-2			POND 19-5			POND 19-6			POND 19-7		
TYPE:	DRY DETENTION		TYPE:	DRY DETENTION		TYPE:	DRY DETENTION		TYPE:	DRY DETENTION		TYPE:	WET RETENTION	
STAGE	AREA	VOLUME	STAGE	AREA	VOLUME	STAGE	AREA	VOLUME	STAGE	AREA	VOLUME	STAGE	AREA	VOLUME
0.00	0.14	--	0.50	0.00	--	0.50	0.08	--	1.50	0.01	--	-1.73	0.00	--
0.50	0.19	0.08	1.00	0.04	0.01	1.00	0.12	0.05	2.00	0.08	0.02	0.50	8.29	9.24
1.00	0.25	0.19	1.50	0.14	0.06	1.50	0.16	0.12	*2.42*	*0.18*	*0.08*	1.00	1.00	11.57
1.50	0.29	0.33	2.00	0.36	0.18	2.00	0.67	0.32	2.50	0.20	0.09	1.50	8.42	13.92
2.00	0.38	0.50	*2.42*	*0.73*	*0.41*	*2.42*	*1.01*	*0.68*	3.00	0.38	0.23	*1.90*	*8.62*	*17.33*
2.42	*0.66*	*0.71*	2.50	0.80	0.48	2.50	1.08	0.76	3.50	0.53	0.46	2.00	8.67	18.19
2.50	0.71	0.77	3.00	0.98	0.92	3.00	1.52	1.41	4.00	0.64	0.75	2.50	8.79	22.56
3.00	1.23	1.25	3.50	1.12	1.45	3.50	1.84	2.25	4.50	0.76	1.11	3.00	8.92	26.99
3.50	1.89	2.03	4.00	1.24	2.04	4.00	2.13	3.24	5.00	0.86	1.51	3.50	9.04	31.47
4.00	2.35	3.09	4.50	1.37	2.69				5.50	0.95	1.96	4.00	9.16	36.02
			5.00	1.50	3.41				6.00	1.05	2.46			
			5.50	1.61	4.19				6.50	1.15	3.01			
			6.00	1.72	5.02				7.00	1.25	3.61			
			6.50	1.84	5.91									
			7.00	1.99	6.87									

The volume at the control structure elevation was used to determine the existing treatment volume in Systems C13-SCOM and C13-NCOM

Summary of Peak Stages

Pond/ Swale/ FD #	Type: [Wet/Dry, Det./Ret., FD]	Disposition [Exist./ Prop./ Modified]	Warning EL. [Min. Berm/ Min. EOP] (ft-NAVD)	PRE-DEVELOPMENT			POST-DEVELOPMENT		
				Max 10yr-24hr Stage (ft-NAVD)	Max 25yr-72hr Stage (ft-NAVD)	Max 100yr-24hr Stage (ft-NAVD)	Max 10yr-24hr Stage (ft-NAVD)	Max 25yr-72hr Stage (ft-NAVD)	Max 100yr-24hr Stage (ft-NAVD)
Swale 19-1	Dry Detention	Modified	4.50	3.09	3.22	3.34	3.66	3.84	4.03
Swale 19-2	Dry Detention	Modified	5.50	3.70	4.48	4.88	2.83	3.29	3.64
Swale 19-6A	Dry Detention	Modified	4.50	3.92	5.08	6.02	3.21	3.94	3.85
Swale 19-6B	Dry Detention	Modified	4.50	3.92	5.08	6.02	3.41	4.62	4.60
Swale 19-7	Dry Detention	Modified	5.00	3.92	5.09	6.03	3.41	4.62	4.60
Swale 19-8	Dry Detention	Modified	7.00	6.27	6.85	7.42	4.14	5.31	5.27
Swale 19-9	Dry Detention	Modified	7.00	5.97	6.90	7.61	5.04	6.34	6.70
Swale 19-10A	Dry Detention	Modified	6.50	4.11	5.59	6.82	3.95	5.16	5.12
Swale 19-10B	Dry Detention	Modified	8.00	4.27	5.71	6.97	4.11	5.27	5.24
Swale 19-10C	Dry Detention	Modified	6.50	4.70	6.31	7.15	4.70	5.86	6.09
Swale 19-13	Dry Detention	Modified	7.00	7.96	8.87	9.45	5.80	6.91	7.35
Swale 19-15	Dry Detention	Modified	8.00	8.09	9.05	9.71	4.22	6.13	6.39
Swale 19-16	Dry Detention	Modified	9.00	7.73	8.55	9.03	5.53	6.65	7.25
Swale 19-17	Dry Detention	Modified	10.00	7.76	8.62	8.67	4.12	5.84	5.69
Pond 19-1	Wet Detention	Existing	4.00	2.17	2.88	3.27	2.92	3.32	3.38
Pond 19-2	Wet Detention	Existing	7.50	2.53	3.23	3.62	3.06	3.86	3.93
Pond 19-5	Wet Detention	Existing	4.00	3.01	3.44	3.67	3.11	3.63	3.69
Pond 19-6	Dry Detention	Existing	7.00	3.33	3.79	4.15	3.37	3.98	4.21
Pond 19-7	Wet Detention	Existing	7.00	4.06	5.49	6.66	3.49	4.98	4.94

Control Structure Summary Table - Proposed Conditions

Control Structure:	Disposition [Exist./ Prop./ Modified]	Weir Type/ Geometry	Weir EL. (ft-NAVD)	Bleeder Type/ Geometry	Bleeder Invert EL. (ft-NAVD)
PrCS19-1	Proposed	Raised Type D Ditch Bottom Inlet	2.42	3" Circular Orifice	0.42
PrCS19-2	Proposed	Trapezoidal Weir	2.70	-	-
PrCS19-3	Proposed	Raised Type H DBI with rectangular notch	2.42	3" Circular Orifice	0.42
PrCS19-5	Proposed	Raised Type H DBI with rectangular notch	2.42	3" Circular Orifice	0.42
PrCS19-10	Proposed	(Internal) Trapezoidal Weir	2.42	-	-
ExCS19-4	Existing	Raised DBI with rectangular weir	2.69	8" Circular Orifice	1.37
ExCS19-5	Existing	Rectangular Weir	1.90	-	-
ExCS19-6A	Existing	Rectangular Weir	1.90	-	-

Min. Berm/Min. EOP was used to determine the criteria to raise the control structures in the ponds, if needed.

Appendix K

System 20

- Land-Use Tables
- Drainage Calculations
- Summary Tables
- ICPR: Pre-Development
- ICPR: Post-Development

I-95 CDC DRAINAGE CALCULATIONS

POST-DEVELOPMENT LAND-USE

DRAINAGE SYSTEM: 20 **SHGWT EL. (ft-NAVD): 1.92**

BASIN	Time of Conc. t_c (min.)	TOTAL AREA (Ac.)	TOTAL ONSITE AREA (Ac.)	ONSITE IMPERVIOUS AREA (Ac.)	ONSITE WATER SURFACE AREA (Ac.)	ONSITE PERVIOUS AREA (Ac.)	TOTAL OFFSITE AREA (Ac.)	OFFSITE IMPERVIOUS AREA (Ac.)	OFFSITE WATER SURFACE AREA (Ac.)	OFFSITE PERVIOUS AREA (Ac.)	AVERAGE GROUND ELEV. (ft-NAVD)	AVERAGE DEPTH TO SHGWT (ft)	COMPACTED SOIL STORAGE (in)	CURVE NUMBER
B20-1	**10**	**4.30**	**4.30**	3.17	0.00	1.13	**0.00**	0.00	0.00	0.00	9.00	7.00	8.18	**82.31**
B20-2	**10**	**8.39**	**8.39**	6.46	0.00	1.93	**0.00**	0.00	0.00	0.00	7.50	6.00	8.18	**84.16**
B20-3	**10**	**2.39**	**2.39**	0.24	0.00	2.15	**0.00**	0.00	0.00	0.00	16.00	14.00	8.18	**57.61**
B20-4	**10**	**8.89**	**8.89**	2.98	0.00	5.91	**0.00**	0.00	0.00	0.00	6.00	4.00	8.18	**64.77**
B20-5	**10**	**3.37**	**3.37**	1.10	0.00	2.27	**0.00**	0.00	0.00	0.00	9.00	7.00	8.18	**64.47**
B20-6	**10**	**8.06**	**8.06**	3.11	0.00	4.95	**0.00**	0.00	0.00	0.00	6.50	5.00	8.18	**66.56**
B20-8	**10**	**2.54**	**2.54**	2.54	0.00	0.00	**0.00**	0.00	0.00	0.00	14.00	12.00	8.18	**100.00**
B20-9	**10**	**4.35**	**4.35**	2.35	0.49	1.51	**0.00**	0.00	0.00	0.00	6.00	4.00	8.18	**77.88**
B20-12	**10**	**2.47**	**2.47**	1.29	0.00	1.18	**0.00**	0.00	0.00	0.00	33.00	31.00	8.18	**71.90**
B20-13	**10**	**3.62**	**3.62**	2.03	0.00	1.59	**0.00**	0.00	0.00	0.00	4.50	3.00	4.95	**82.14**
B20-16	**10**	**4.17**	**4.17**	3.12	0.00	1.05	**0.00**	0.00	0.00	0.00	6.00	4.00	8.18	**82.92**
B20-17	**10**	**2.19**	**2.19**	1.80	0.00	0.39	**0.00**	0.00	0.00	0.00	6.00	4.00	8.18	**87.29**
B20-18	**10**	**0.78**	**0.78**	0.00	0.09	0.69	**0.00**	0.00	0.00	0.00	4.50	3.00	4.95	**69.55**
B20-19	**10**	**0.46**	**0.46**	0.03	0.00	0.43	**0.00**	0.00	0.00	0.00	5.50	4.00	8.18	**56.67**
B20-20	**10**	**0.97**	**0.97**	0.40	0.00	0.57	**0.00**	0.00	0.00	0.00	6.00	4.00	8.18	**67.54**
B20-21	**10**	**3.51**	**3.51**	1.55	0.00	1.96	**0.00**	0.00	0.00	0.00	6.00	4.00	8.18	**68.64**
B20-22	**10**	**10.41**	**10.41**	1.77	0.00	8.64	**0.00**	0.00	0.00	0.00	4.00	2.00	1.88	**86.50**
B20-23	**10**	**9.57**	**9.57**	6.06	0.00	3.51	**0.00**	0.00	0.00	0.00	6.50	5.00	8.18	**76.92**
B20-24	**10**	**11.03**	**11.03**	1.44	3.48	6.11	**0.00**	0.00	0.00	0.00	4.50	3.00	4.95	**78.48**
B20-25A	**10**	**2.78**	**2.78**	1.25	0.00	1.53	**0.00**	0.00	0.00	0.00	8.50	7.00	8.18	**68.96**
B20-25B	**10**	**0.26**	**0.26**	0.02	0.00	0.24	**0.00**	0.00	0.00	0.00	8.50	7.00	8.18	**56.98**
B20-26	**10**	**9.68**	**9.68**	3.37	0.00	6.31	**0.00**	0.00	0.00	0.00	6.00	4.00	8.18	**65.22**
B20-27	**10**	**0.64**	**0.64**	0.48	0.00	0.16	**0.00**	0.00	0.00	0.00	10.00	8.00	8.18	**83.02**
B20-28	**10**	**0.57**	**0.57**	0.53	0.00	0.04	**0.00**	0.00	0.00	0.00	10.50	9.00	8.18	**94.57**
B20-29	**10**	**0.54**	**0.54**	0.10	0.00	0.44	**0.00**	0.00	0.00	0.00	8.00	6.00	8.18	**60.01**
B20-30	**10**	**1.21**	**1.21**	0.27	0.00	0.94	**0.00**	0.00	0.00	0.00	7.50	6.00	8.18	**61.14**
B20-31	**10**	**9.74**	**9.74**	5.35	0.00	4.39	**0.00**	0.00	0.00	0.00	6.50	5.00	8.18	**73.06**
B20-32	**10**	**2.83**	**2.83**	0.65	0.00	2.18	**0.00**	0.00	0.00	0.00	5.50	4.00	8.18	**61.35**
B20-33	**10**	**0.30**	**0.30**	0.30	0.00	0.00	**0.00**	0.00	0.00	0.00	10.00	8.00	8.18	**100.00**
B20-34	**10**	**5.21**	**5.21**	1.02	1.69	2.50	**0.00**	0.00	0.00	0.00	5.00	3.00	4.95	**80.81**
B20-35	**10**	**0.45**	**0.45**	0.00	0.39	0.06	**0.00**	0.00	0.00	0.00	1.50	0.00	0.00	**100.00**
B20-36	**10**	**0.52**	**0.52**	0.00	0.44	0.08	**0.00**	0.00	0.00	0.00	1.50	0.00	0.00	**100.00**

These values were used to determine the existing surplus capacity in Systems C14-SCYP and C14-NCYP.

I-95 CDC DRAINAGE CALCULATIONS

POST-DEVELOPMENT LAND-USE

DRAINAGE SYSTEM: 20 **SHGWT EL. (ft-NAVD): 1.92**

BASIN	Time of Conc. t_c (min.)	TOTAL AREA (Ac.)	TOTAL ONSITE AREA (Ac.)	ONSITE IMPERVIOUS AREA (Ac.)	ONSITE WATER SURFACE AREA (Ac.)	ONSITE PERVIOUS AREA (Ac.)	TOTAL OFFSITE AREA (Ac.)	OFFSITE IMPERVIOUS AREA (Ac.)	OFFSITE WATER SURFACE AREA (Ac.)	OFFSITE PERVIOUS AREA (Ac.)	AVERAGE GROUND ELEV. (ft-NAVD)	AVERAGE DEPTH TO SHGWT (ft)	COMPACTED SOIL STORAGE (in)	CURVE NUMBER
CFC	**10**	**4.15**	**0.00**	0.00	0.00	0.00	**4.15**	3.15	0.21	0.79	7.00	5.00	8.18	**86.53**
CYPRESS-1A	**10**	**3.60**	**0.00**	0.00	0.00	0.00	**3.60**	2.21	0.00	1.39	6.50	5.00	8.18	**76.00**
CYPRESS-1B	**10**	**6.17**	**0.00**	0.00	0.00	0.00	**6.17**	3.39	1.92	0.86	6.50	5.00	8.18	**89.77**
CYPRESS-1C	**10**	**6.21**	**0.00**	0.00	0.00	0.00	**6.21**	0.00	0.00	6.21	6.50	5.00	8.18	**55.01**
CYPRESS-2	**10**	**7.48**	**0.00**	0.00	0.00	0.00	**7.48**	5.49	0.55	1.44	6.50	5.00	8.18	**86.39**
CYPRESS-3	**10**	**17.77**	**0.00**	0.00	0.00	0.00	**17.77**	9.85	0.00	7.92	6.50	5.00	8.18	**73.28**
RADICE	**10**	**30.00**	**0.00**	0.00	0.00	0.00	**30.00**	19.60	6.16	4.24	6.50	5.00	8.18	**89.64**
SYSTEM TOTALS:		**201.58**	**126.20**	54.78	6.58	64.84	**75.38**	43.69	8.84	22.85	--	--	--	--

These values were used to determine the existing surplus capacity in Systems C14-SCYP and C14-NCYP.

I-95 CDC DRAINAGE CALCULATIONS

WATER QUALITY

Drainage System: *20*

SYSTEM	SHGWT EL. (ft-NAVD)	TOTAL ONSITE AREA (Ac.) *[POST-DEV.]*	ONSITE IMPERVIOUS AREA (Ac.) *[POST-DEV.]*	ONSITE PERVIOUS AREA (Ac.) *[POST-DEV.]*	1" OVER TOTAL ONSITE AREA (Ac-ft)	2.5" OVER IMPERVIOUS AREA (Ac-ft)	[1]WATER QUALITY TREATMENT REQUIRED (Ac-ft)	DRY-DETENTION TREATMENT VOLUME PROVIDED (Ac-ft)	WET-DETENTION TREATMENT VOLUME PROVIDED (Ac-ft)	DRY- / WET-RETENTION TREATMENT VOLUME PROVIDED (Ac-ft)	FRENCH DRAIN TREATMENT VOLUME PROVIDED (Ac-ft)	[2]TOTAL TREATMENT VOLUME PROVIDED (Ac-ft)	[3]SURPLUS TREATMENT VOLUME PROVIDED (Ac-ft)
20	1.92	126.20	54.78	64.84	10.52	11.41	**11.41**	7.91	0.92			**11.47**	**0.06**

[1] Greater of 1" over Total Onsite Area and 2.5" over Onsite Impervious Area (excluding Water Surface Areas); Volume based on wet detention requirements.

[2] Sum of all treatment provided; Retention and Dry Detention volumes divided by 0.50 and 0.75, respectively to account for 50% and 25% credits.

[3] Water quality treatment in System 20 provided for all onsite contributing basins with the exception of B20-24, B20-34, B20-35, and B20-36 (located downstream of existing/proposed control structures). Basins B20-24 and B20-34 will continue discharge to adjacent "Cypress" and "Radice" stormwater management systems and continue to be treated by existing downstream control structures; B20-35 and B20-36 are portions of C-14 Canal within I-95 L/A ROW. Water quality in System 20 provided for offsite contributing basin CFC (4.15 acres). In conjunction with System 21A, which will provide treatment for approximately 10.20 acres, a total of 14.35 acres of offsite area will be treated prior to discharge into the C-14 Canal.

POND 20-1			POND 20-2			POND 20-3			POND 20-4			POND 20-5		
TYPE:	Wet Detention		TYPE:	Dry Detention		TYPE:	Wet Detention		TYPE:	Dry Detention		TYPE:	Dry Detention	
STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)
1.92	0.48	--			--	1.92	0.09	--	2.92	0.08	--			--
2.92	0.53	0.51	2.92	0.32	--	2.92	0.11	0.10	4.00	0.11	0.11	2.92	6.57	--
3.00	0.54	0.55	3.00	0.33	0.03	3.00	0.11	0.11	5.00	0.15	0.24	3.00	6.58	0.53
3.40	***0.57***	***0.77***	***3.40***	***0.35***	***0.16***	***3.40***	***0.12***	***0.16***	***5.17***	***0.15***	***0.26***	***3.40***	***6.65***	***3.17***
4.00	0.61	1.12	4.00	0.38	0.38	4.00	0.13	0.23	6.00	0.18	0.40	4.00	6.75	7.19

POND 20-6			POND 20-7			POND 20-8			SWALE 20-1			SWALE 20-2		
TYPE:	Dry Detention		TYPE:	Dry Detention		TYPE:	Dry Detention		TYPE:	Dry Detention		TYPE:	Dry Detention	
STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)
2.92	1.36	--	2.92	1.23	--	2.92	1.76	--	2.92	0.01	--	2.92	0.26	--
3.00	1.37	0.11	3.00	1.42	0.11	3.00	1.77	0.14	3.00	0.10	0.00	3.00	0.26	0.02
3.40	***1.41***	***0.66***	***3.40***	***2.31***	***0.85***	***3.40***	***1.83***	***0.86***	***3.40***	***0.15***	***0.05***	***3.40***	***0.42***	***0.16***
4.00	1.46	1.52	4.00	3.65	2.64	4.00	1.91	1.98	4.00	0.22	0.16	4.00	0.66	0.48

SWALE 20-4			SWALE 20-5			SWALE 20-6			SWALE 20-9			SWALE 20-10		
TYPE:	Dry Detention		TYPE:	Dry Detention		TYPE:	Dry Detention		TYPE:	Dry Detention		TYPE:	Dry Detention	
STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)
2.92	0.00	--	2.92	0.39	--	2.92	0.87	--	2.92	0.09	--	2.92	0.42	--
3.00	0.01	0.00	3.00	0.41	0.03	3.00	0.89	0.07	3.00	0.10	0.01	3.00	0.43	0.03
3.40	***0.08***	***0.02***	***3.40***	***0.47***	***0.21***	***3.40***	***1.04***	***0.46***	***3.40***	***0.12***	***0.05***	***3.40***	***0.46***	***0.21***
4.00	0.17	0.09	4.00	0.56	0.52	4.00	1.26	1.15	4.00	0.14	0.13	4.00	0.51	0.50

SWALE 20-12A			SWALE 20-12B			SWALE 20-14		
TYPE:	Dry Detention		TYPE:	Dry Detention		TYPE:	Dry Detention	
STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)	STAGE (ft-NAVD)	AREA (Ac.)	VOLUME (Ac-ft)
2.92	0.66	--	2.92	0.06	--	2.92	0.71	--
3.00	0.67	0.05	3.00	0.06	0.00	3.00	0.77	0.06
3.40	***0.70***	***0.33***	***3.40***	***0.07***	***0.03***	***3.40***	***1.05***	***0.42***
4.00	0.74	0.76	4.00	0.09	0.08	4.00	1.46	1.17

The volume at the control structure elevation was used to determine the existing treatment volume in Systems C14-SCYP and C13-NCYP

I-95 CDC DRAINAGE CALCULATIONS

DRAINAGE SYSTEM SUMMARY TABLES

Drainage System: ***20***

Summary of Peak Discharges								
Receiving Waterbody:	**C-14 Canal**							
PRE-DEVELOPMENT								
ICPR Link:	**Outfall Description:**	**Flow Area (ft^2)**	**10yr-24hr Peak Flow Rate (cfs)**	**10yr-24hr Peak Flow Velocity (fps)**	**25yr-72hr Peak Flow Rate (cfs)**	**25yr-72hr Peak Flow Velocity (fps)**	**100yr-24hr Peak Flow Rate (cfs)**	**100yr-24hr Peak Flow Velocity (fps)**
ExPipe20-21	54" Pipe	15.90	105.72	6.65	128.07	8.05	140.79	8.85
ExCS20-2	42" Pipe	9.62	7.68	0.80	28.39	2.95	24.68	2.57
	PRE-DEVELOPMENT TOTALS:	--	--	--	**156.46**	--	--	--
POST-DEVELOPMENT								
ICPR Link:	**Pipe/Weir Description:**	**Flow Area (ft^2)**	**10yr-24hr Peak Flow Rate (cfs)**	**10yr-24hr Peak Flow Velocity (fps)**	**25yr-72hr Peak Flow Rate (cfs)**	**25yr-72hr Peak Flow Velocity (fps)**	**100yr-24hr Peak Flow Rate (cfs)**	**100yr-24hr Peak Flow Velocity (fps)**
ExPipe20-21	54" Pipe	15.90	102.79	6.46	140.20	8.82	146.37	9.20
ExCS20-2	42" Pipe	9.62	5.25	0.55	26.01	2.70	24.16	2.51
	POST-DEVELOPMENT TOTALS:	--	--	--	**166.21**	--	--	--
Pre-Post 25yr-72hr Peak Discharge Reduction (cfs):				***-9.75***				

Note: Considering 20.65 cfs reduction into C-14 Canal from System 21A, net reduction into C-14 Canal is 10.90 cfs.

Summary of Peak Stages									
				PRE-DEVELOPMENT			**POST-DEVELOPMENT**		
Pond/ Swale/ FD #	**Type: [Wet/Dry, Det./Ret., FD]**	**Disposition [Exist./ Prop./ Modified]**	**Warning EL. [Min. Berm/ Min. EOP] (ft-NAVD)**	**Max 10yr-24hr Stage (ft-NAVD)**	**Max 25yr-72hr Stage (ft-NAVD)**	**Max 100yr-24hr Stage (ft-NAVD)**	**Max 10yr-24hr Stage (ft-NAVD)**	**Max 25yr-72hr Stage (ft-NAVD)**	**Max 100yr-24hr Stage (ft-NAVD)**
CFC	Wet Ret.	Exist.	6.50	6.54	6.80	6.73	4.74	5.67	5.95
CYPRESS-1	Wet Pond	Exist.	5.50	3.04	3.57	3.91	2.98	3.89	4.07
CYPRESS-2	Wet Pond	Exist.	5.50	3.05	3.57	3.92	2.98	3.90	4.08
CYPRESS-3	Wet Pond	Exist.	5.50	4.31	4.95	5.32	4.31	4.95	5.32
Pond20-1	Wet Det.	Modified	6.50	4.96	5.97	6.12	4.40	5.19	5.40
Pond20-2	Dry Det.	Modified	6.80	5.76	7.01	7.45	4.10	4.84	4.92
Pond20-3	Wet Det.	Exist.	6.00	4.83	5.62	5.74	4.41	5.17	5.36
Pond20-4	Dry Det.	Exist.	6.00	4.23	5.61	5.73	4.23	5.19	5.20
Pond20-5	Dry Det.	Modified	7.50	3.07	3.59	3.94	3.97	4.64	4.73
Pond20-6	Dry Det.	Modified	10.00	3.06	3.58	3.93	3.95	4.64	4.72
Pond20-7	Dry Det.	Exist.	8.00	4.39	5.43	5.34	4.04	4.83	4.89
Pond20-8	Dry Det.	Modified	9.00	4.39	5.42	5.33	4.16	5.27	5.22
RADICE	Wet Det.	Exist.	5.50	4.39	5.42	5.27	4.20	5.32	5.25
Swale20-1	Dry Det.	Modified	5.50	5.39	6.26	6.63	4.70	5.59	5.92
Swale20-2	Dry Det.	Modified	5.50	5.28	6.21	6.55	4.68	5.56	5.88
Swale20-3	Dry Det.	Modified	6.50	6.54	7.31	6.97	5.30	6.01	6.26
Swale20-4	Dry Det.	Exist.	5.30	6.54	7.02	6.85	5.09	5.80	6.07

Min. Berm/Min. EOP was used to determine the criteria to raise the control structures in System C14-NCYP.

I-95 CDC DRAINAGE CALCULATIONS

DRAINAGE SYSTEM SUMMARY TABLES

Drainage System: ***20***

Swale20-5	Dry Det.	Modified	6.50	6.54	6.79	6.72	4.73	5.66	5.94
Swale20-6	Dry Det.	Modified	5.50	5.07	6.06	6.26	4.54	5.33	5.54
Swale20-9	Dry Det.	Exist.	7.00	3.16	3.57	3.92	3.74	4.08	4.24
Swale20-10	Dry Det.	Modified	7.50	3.31	3.67	3.93	3.81	4.29	4.43
Swale20-11	Dry Det.	Exist.	9.25	9.16	9.17	9.17	9.07	9.16	9.16
Swale20-12A	Dry Det.	Modified	5.70	5.82	6.34	6.62	4.56	5.37	5.57
Swale20-12B	Dry Det.	Prop.	6.50	--	--	--	4.11	4.91	5.05
Swale20-13	Dry Det.	Exist.	9.50	7.15	7.36	7.70	7.15	7.36	7.70
Swale20-14	Dry Det.	Exist.	5.60	4.39	5.42	5.27	4.16	5.29	5.24
Swale20-15	Dry Det.	Exist.	7.30	6.34	6.58	6.75	6.34	6.58	6.75

Control Structure Summary Table - Proposed Conditions

Control Structure:	Disposition [Exist./ Prop./ Modified]	Weir Type/ Geometry	Weir EL. (ft-NAVD)	Bleeder Type/ Geometry	Bleeder Invert EL. (ft-NAVD)
ExCS20-1	Modified	Internal Weir Wall	3.40	--	--
ExCS20-2	Exist.	Internal Weir Wall	3.42	V-Notch (31 degrees)	1.92
PrCS20-1	Prop.	Raised Type H Ditch Bottom Inlet	3.40	V-Notch (43 degrees)	1.92
PrCS20-2	Prop.	Raised Type H Ditch Bottom Inlet	3.40	V-Notch (43 degrees)	1.92
PrCS20-3	Prop.	Raised Type H Ditch Bottom Inlet	3.40	--	--
PrCS20-4	Prop.	Raised Type E Ditch Bottom Inlet	3.40	--	--

Min. Berm/Min. EOP was used to determine the criteria to raise the control structures in the ponds for System C14-NCYP.

CONSTRUCTION CONTRACT NO.

COMPONENTS OF PERMIT PLANS SET

PERMIT PLANS
EROSION CONTROL PLANS

A DETAILED INDEX APPEARS ON THE KEY SHEET OF EACH COMPONENT

INDEX OF ROADWAY PLANS

SHEET NO.	SHEET DESCRIPTION
K-1	KEY SHEET
P-1 THRU P-4	PROJECT LAYOUT
BL-1	BASELINE SURVEY REFERENCE
T-S1 THRU TS-24	TYPICAL SECTIONS
R-1 THRU R-38	ROADWAY PLANS
PD-1 THRU PD-29	POND DETAILS
DD-1 THRU DD-18	DRAINAGE DETAILS
X-1 THRU X-153	CROSS SECTIONS
CTL-1 THRU CTL-19	PROJECT SURVEY CONTROL

GOVERNING STANDARDS AND SPECIFICATIONS:
Florida Department of Transportation, 2014 Design Standards and revised Index Drawings as appended herein, and 2013 Standard Specifications for Road and Bridge Construction, as amended by Contract Documents.

For Design Standards click on the "Design Standards" link at the following web site:
http://www.dot.state.fl.us/rddesign/
Design Standards

For the Standard Specifications for Road and Bridge Construction click on the "Specifications" link at the following web site:
http://www.dot.state.fl.us/specificationsoffice/
Standard Specifications

REVISIONS

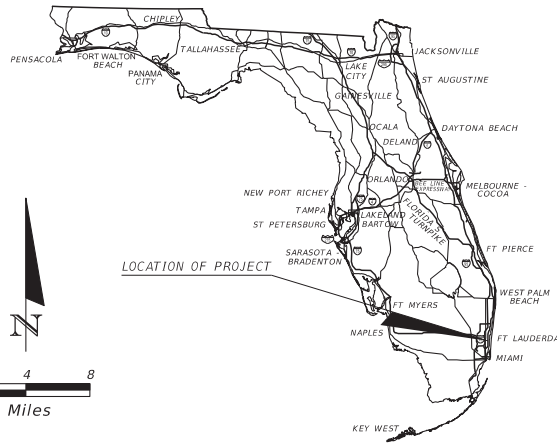
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

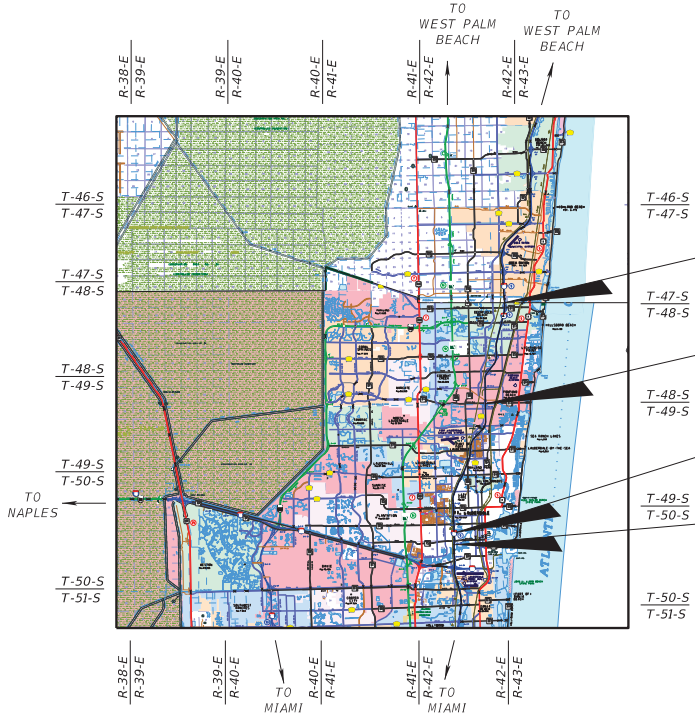
PERMIT PLANS

FINANCIAL PROJECT ID 433108-4-52-01

BROWARD COUNTY (86070)

STATE ROAD NO. 9 (I-95)





PLANS PREPARED BY:

HDR ENGINEERING, INC.
15450 NEW BARN ROAD - SUITE 304
MIAMI LAKES, FL 33014
TEL: (305) 728-7400
FAX: (305) 728-7447
VENDOR NO. F59-2986466
FL. CERTIFICATE NO. EB0005620

NOTE: THE SCALE OF THESE PLANS MAY HAVE CHANGED DUE TO REPRODUCTION.

DRAFT SET
MAY 15, 2014

LENGTH OF PROJECT

	LINEAR FEET	MILES
ROADWAY	46,041.92	8.720
BRIDGES	2,740.00	0.519
NET LENGTH OF PROJECT	48,781.92	9.239
EXCEPTIONS	0.00	0.000
GROSS LENGTH OF PROJECT	48,781.92	9.239

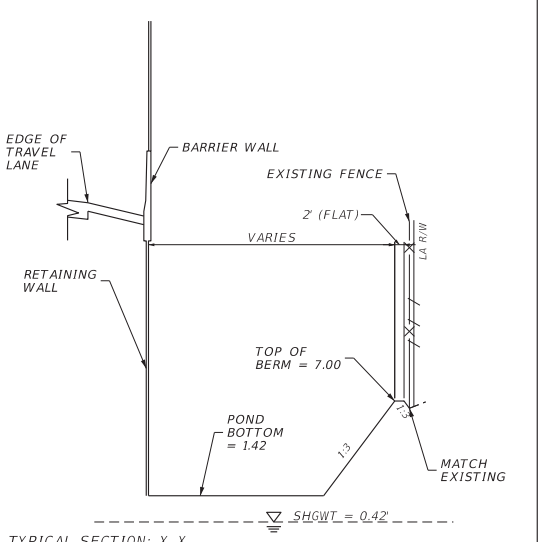
FDOT PROJECT MANAGER: ROBERT BOSTIAN, P.E.

KEY SHEET REVISIONS	
DATE	DESCRIPTION

PERMIT PLANS
ENGINEER OF RECORD: JAVIER MANSO, P.E.

P.E. NO.: 69183

FISCAL YEAR	SHEET NO.
15	K-1



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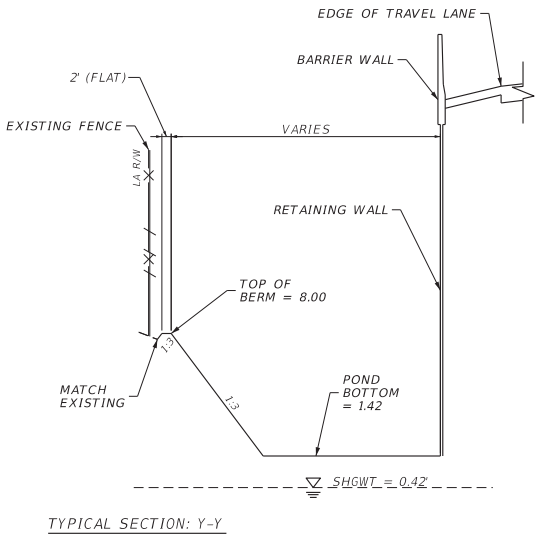
N.T.S.



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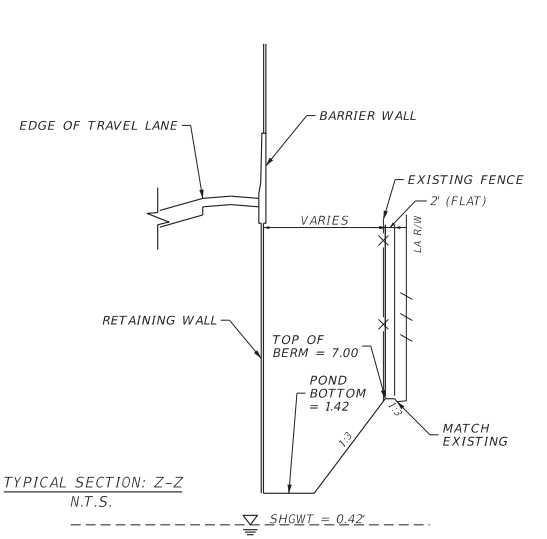

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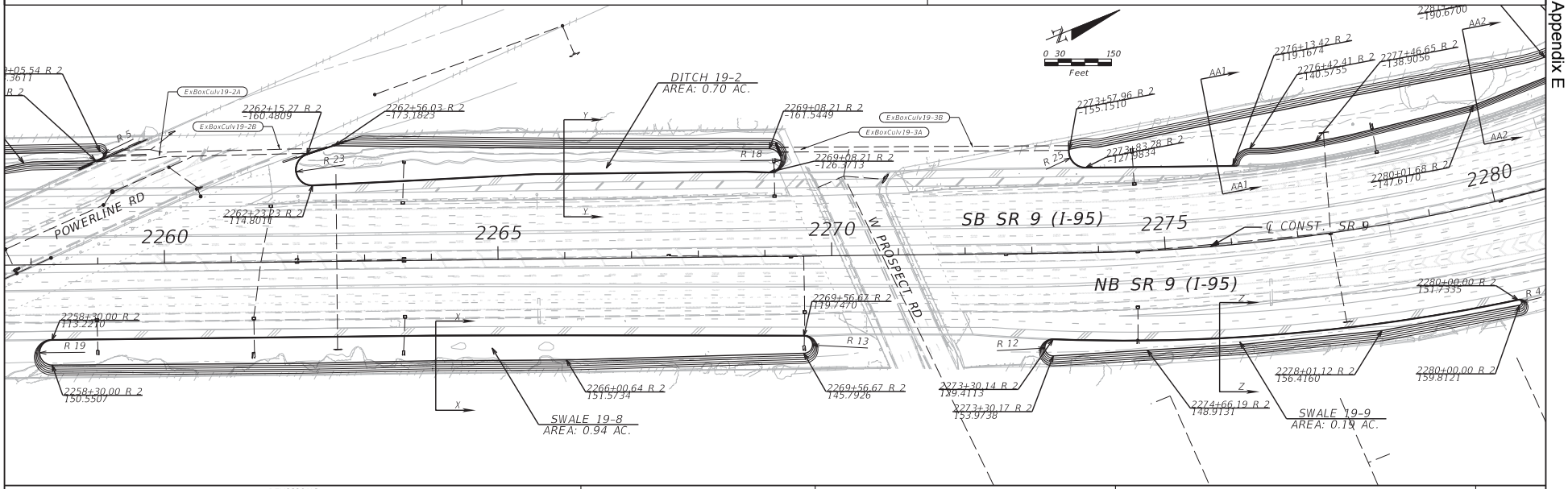


REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

Reynolds, Smith and Hills, Inc.
3125 W. Commercial Blvd. - Suite 130
Fort Lauderdale, Florida 33309-3446
954-474-3005
FL Cert. No. EB0005620
Christian B. Jackson, P.E. No. 61898

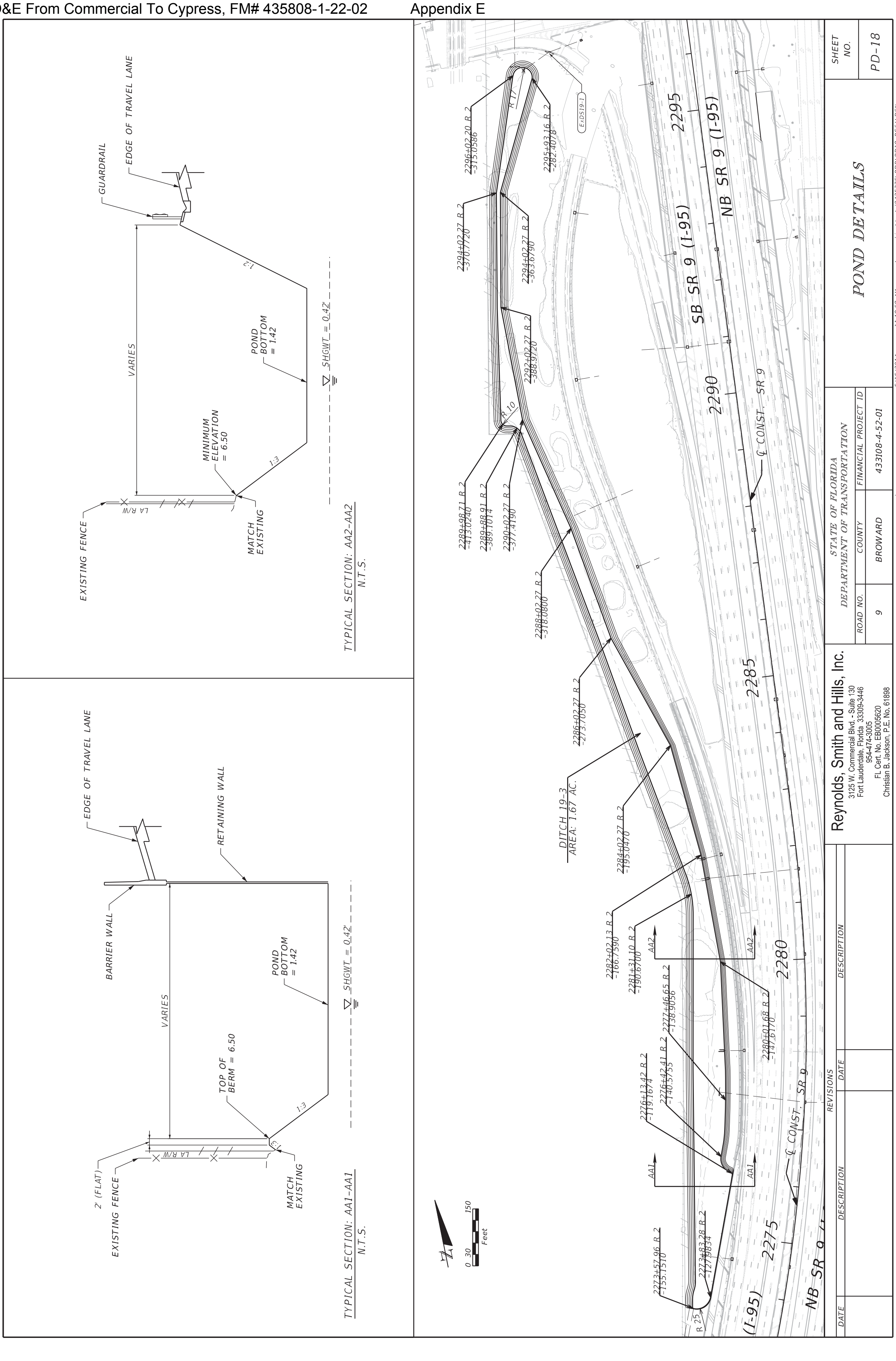
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	433108-4-52-01

POND DETAILS

SHEET NO. PD-17

caycedov 5/15/2014 11:18:47 AM c:\pwworking\tpa\d0435325\PDPLRD17_RS&H.DGN


TYPICAL SECTION: AA1-AA1
N.T.S.
EXISTING FENCE
2' (FLAT)
LA R/W
MATCH EXISTING
TOP OF BERM = 6.50
VARIES
BARRIER WALL
EDGE OF TRAVEL LANE
RETAINING WALL
POND BOTTOM = 1.42
SHGWT = 0.42'
1:3
TYPICAL SECTION: AA2-AA2
N.T.S.
EXISTING FENCE
LA R/W
MATCH EXISTING
MINIMUM ELEVATION = 6.50
VARIES
GUARDRAIL
EDGE OF TRAVEL LANE
POND BOTTOM = 1.42
SHGWT = 0.42'
1:2
1:3
0 30 150
Feet
DITCH 19-3
AREA: 1.67 AC.
SB SR 9 (I-95)
NB SR 9 (I-95)
℄ CONST. SR 9
2275
2280
2285
2290
2295
2273+57.96 R 2
-155.1510
2273+83.28 R 2
-127.9834
2276+13.42 R 2
-119.1674
2276+42.41 R 2
-140.5755
2277+46.65 R 2
-138.9056
2280+01.68 R 2
-147.6170
2281+31.10 R 2
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2282+02.13 R 2
-166.7590
2284+02.27 R 2
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2289+98.71 R 2
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2289+88.91 R 2
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2294+02.27 R 2
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2296+02.20 R 2
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2295+93.16 R 2
-282.4078
R 25
R 10
R 17
AA1
AA2
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Fort Lauderdale, Florida 33309-3446
954-474-3005
FL Cert. No. EB0005620
Christian B. Jackson, P.E. No. 61898
REVISIONS
DATE
DESCRIPTION
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
ROAD NO.
9
COUNTY
BROWARD
FINANCIAL PROJECT ID
433108-4-52-01
POND DETAILS
SHEET NO.
PD-18
5/15/2014
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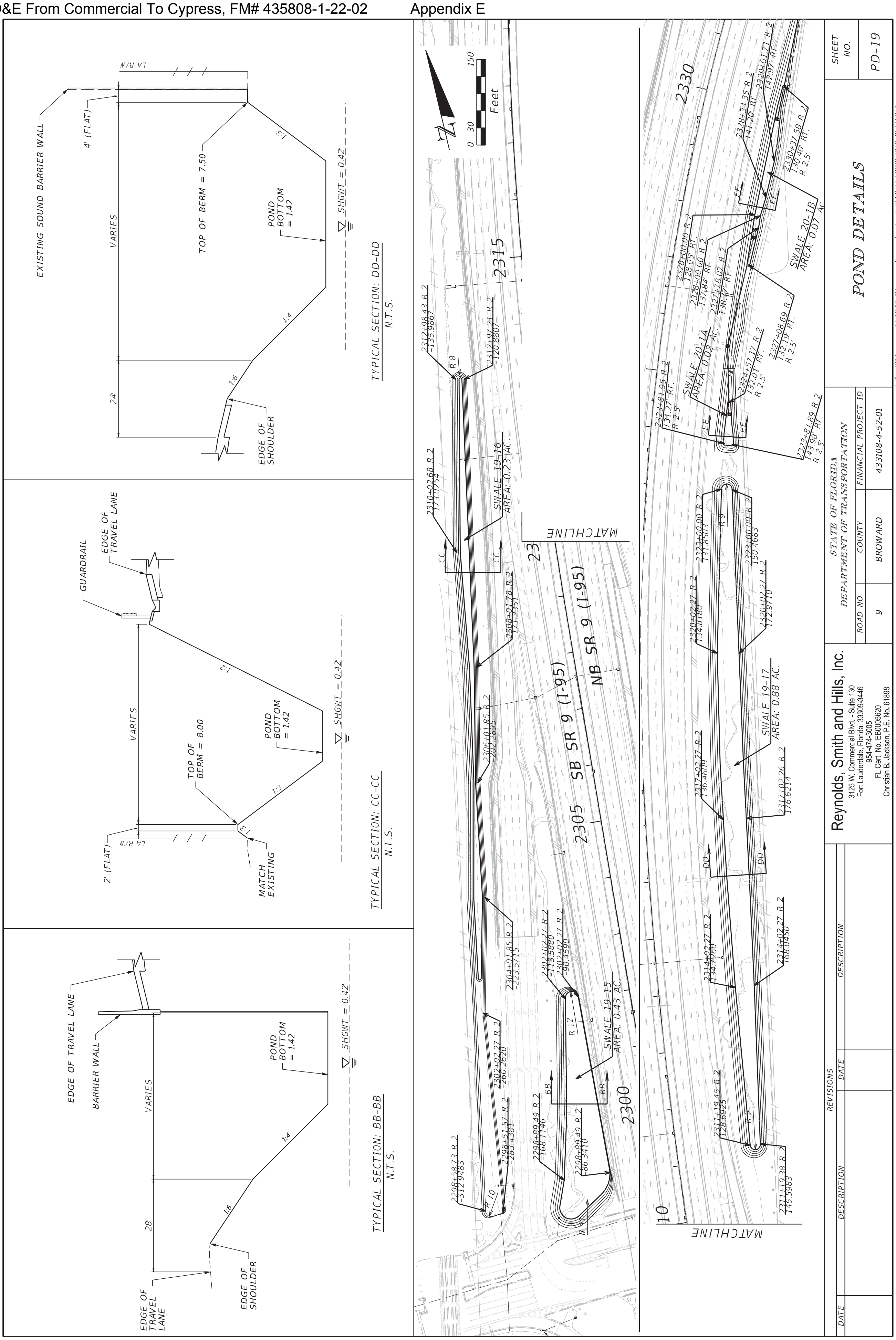
caycedov


TYPICAL SECTION: BB-BB
N.T.S.
EDGE OF TRAVEL LANE
BARRIER WALL
VARIES
POND BOTTOM = 1.42
SHGWT = 0.42'
28'
1:6
1:4
EDGE OF TRAVEL LANE
EDGE OF SHOULDER
TYPICAL SECTION: CC-CC
N.T.S.
GUARDRAIL
EDGE OF TRAVEL LANE
2' (FLAT)
LA R/W
TOP OF BERM = 8.00
MATCH EXISTING
1:3
1:2
TYPICAL SECTION: DD-DD
N.T.S.
EXISTING SOUND BARRIER WALL
4' (FLAT)
TOP OF BERM = 7.50
24'
SB SR 9 (I-95)
NB SR 9 (I-95)
MATCHLINE
SWALE 19-15 AREA: 0.43 AC.
SWALE 19-16 AREA: 0.23 AC.
SWALE 19-17 AREA: 0.88 AC.
SWALE 20-1A AREA: 0.02 AC.
SWALE 20-1B AREA: 0.07 AC.
0 30 150
Feet
Reynolds, Smith and Hills, Inc.
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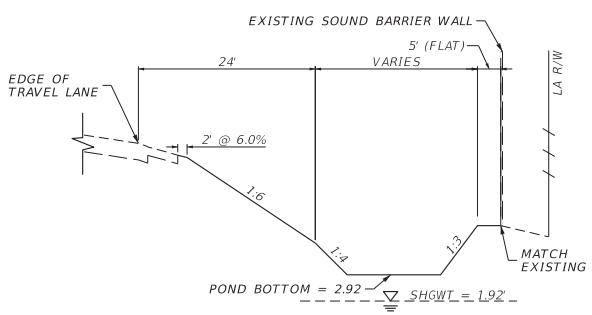
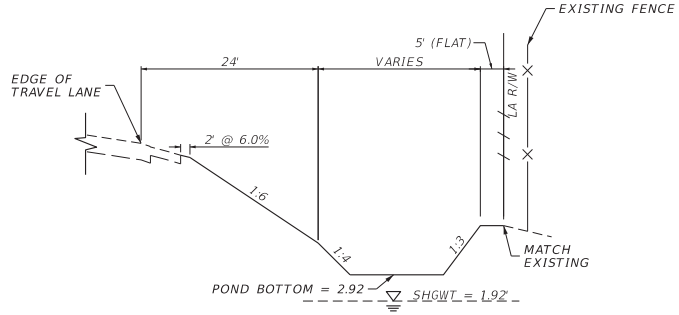
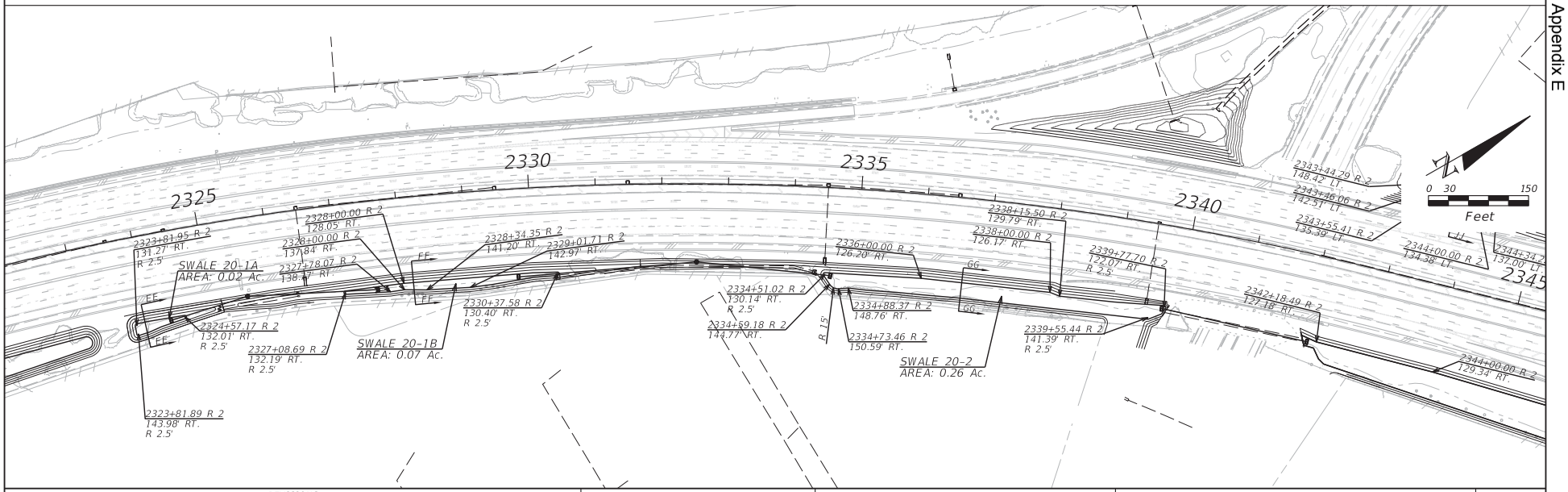
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
ROAD NO. 9
COUNTY BROWARD
FINANCIAL PROJECT ID 433108-4-52-01
POND DETAILS
SHEET NO. PD-19
5/15/2014
11:19:18 AM



TYPICAL SECTIONS: EE,FF
N.T.S.



TYPICAL SECTION: GG
N.T.S.



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9	BROWARD	433108-4-52-01

POND DETAILS

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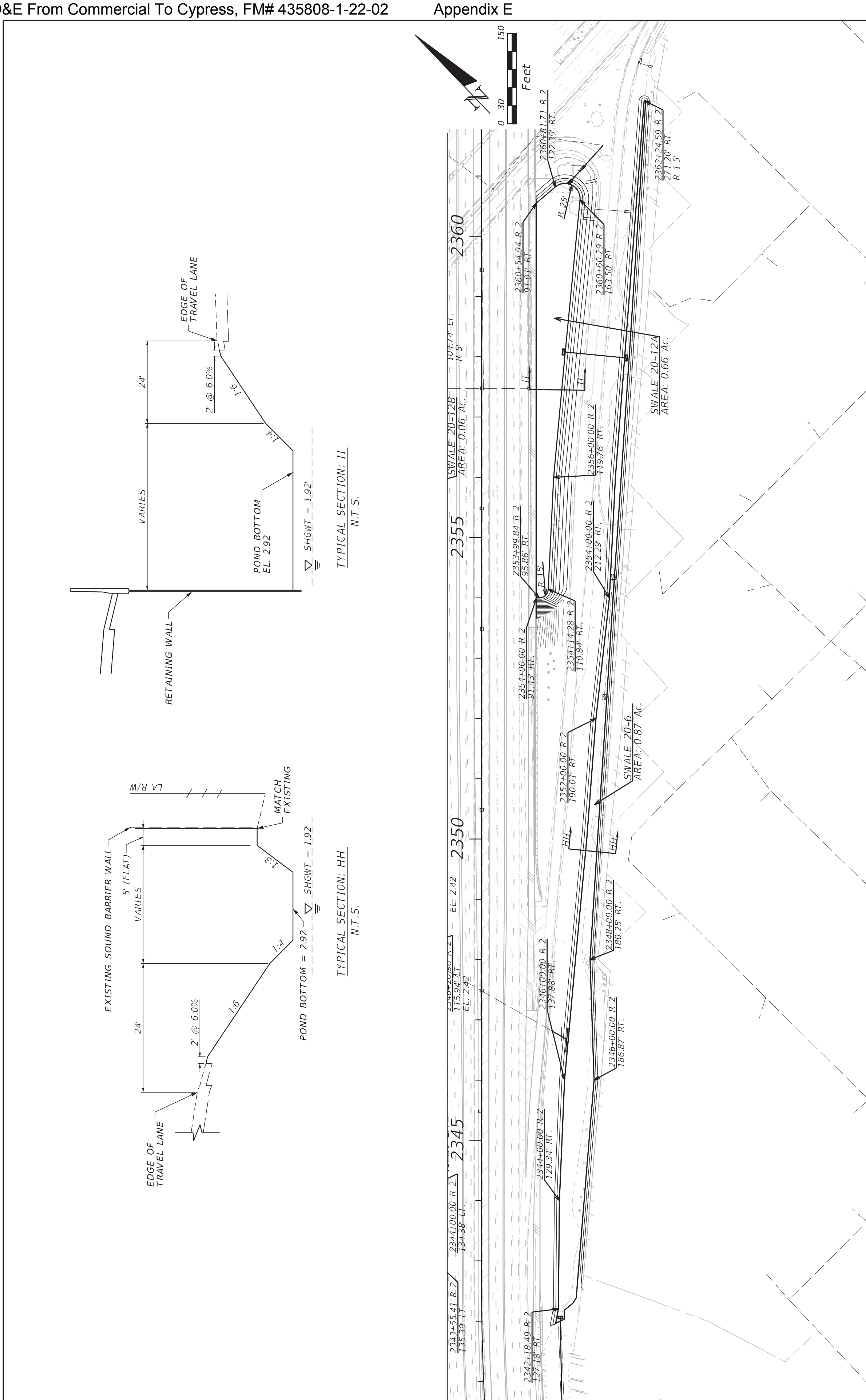

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9	BROWARD	433108-4-52-01

POND DETAILS

SHEET NO.
PD-21

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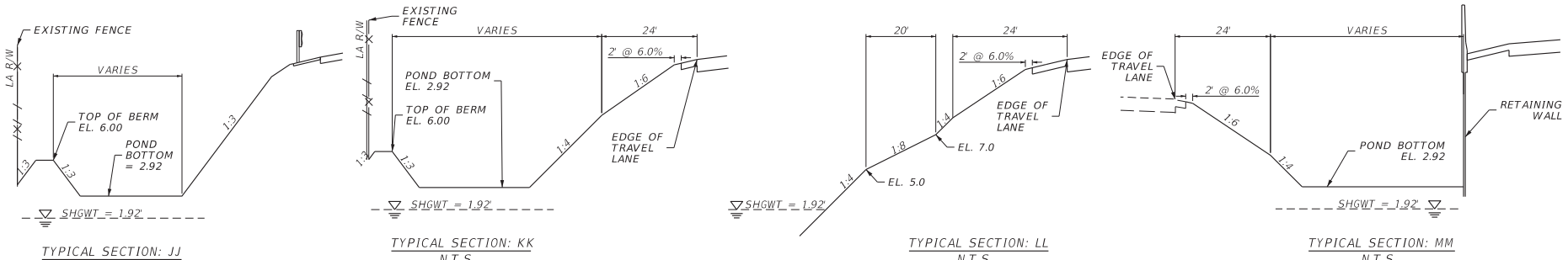

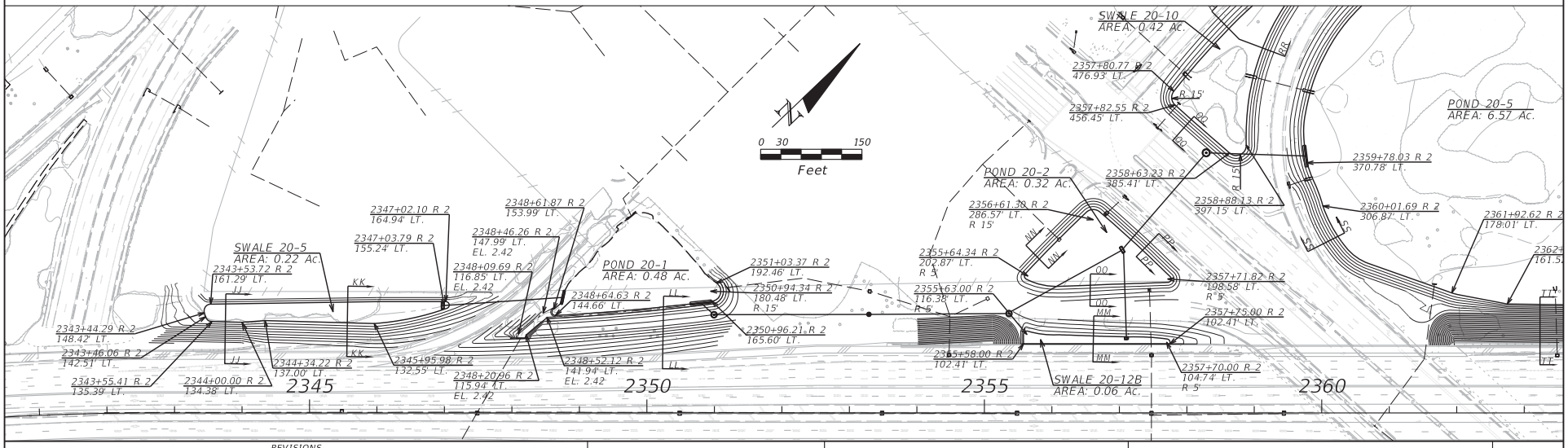

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POND DETAILS

SHEET NO. PD-22

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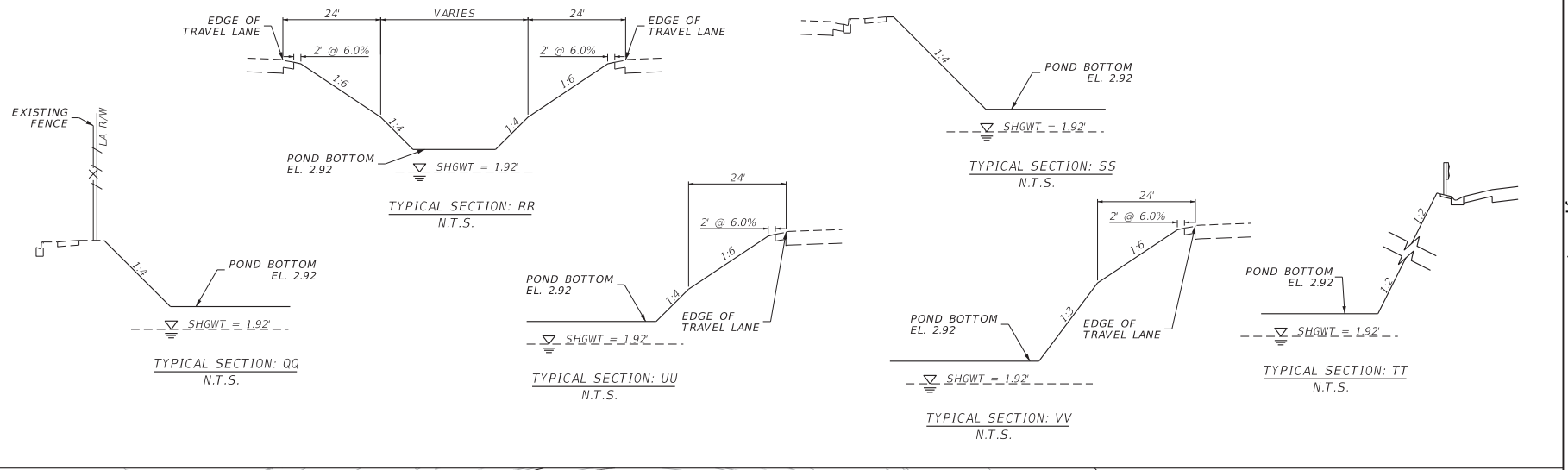

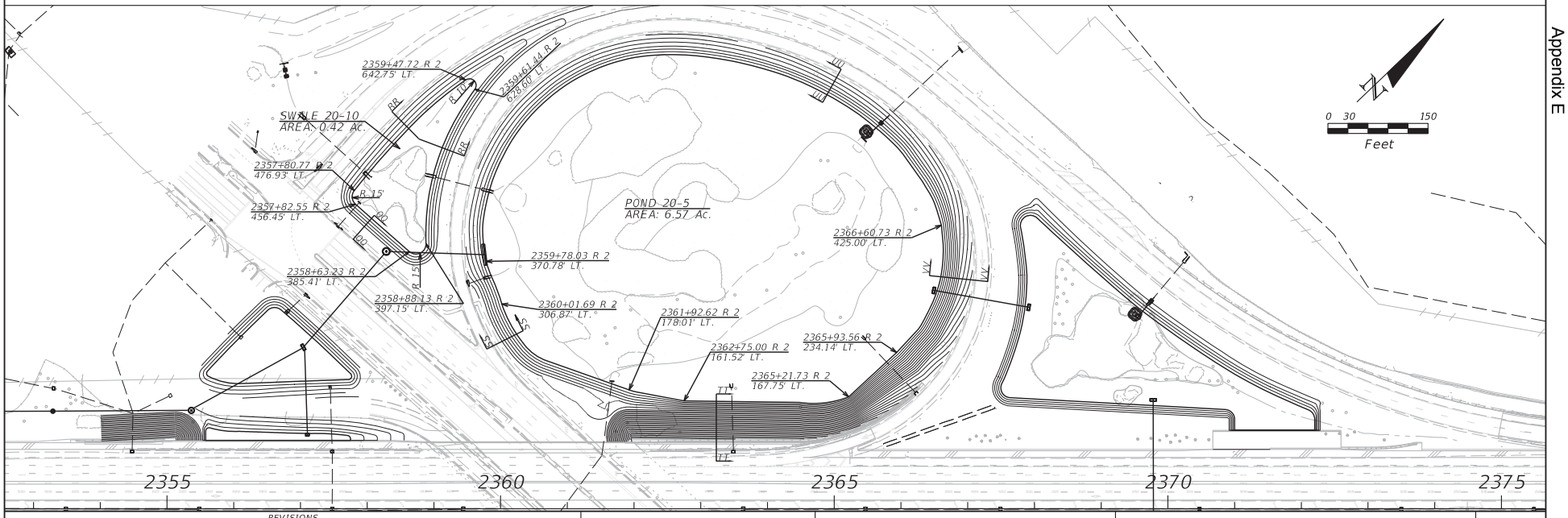

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POND DETAILS

SHEET NO. PD-23

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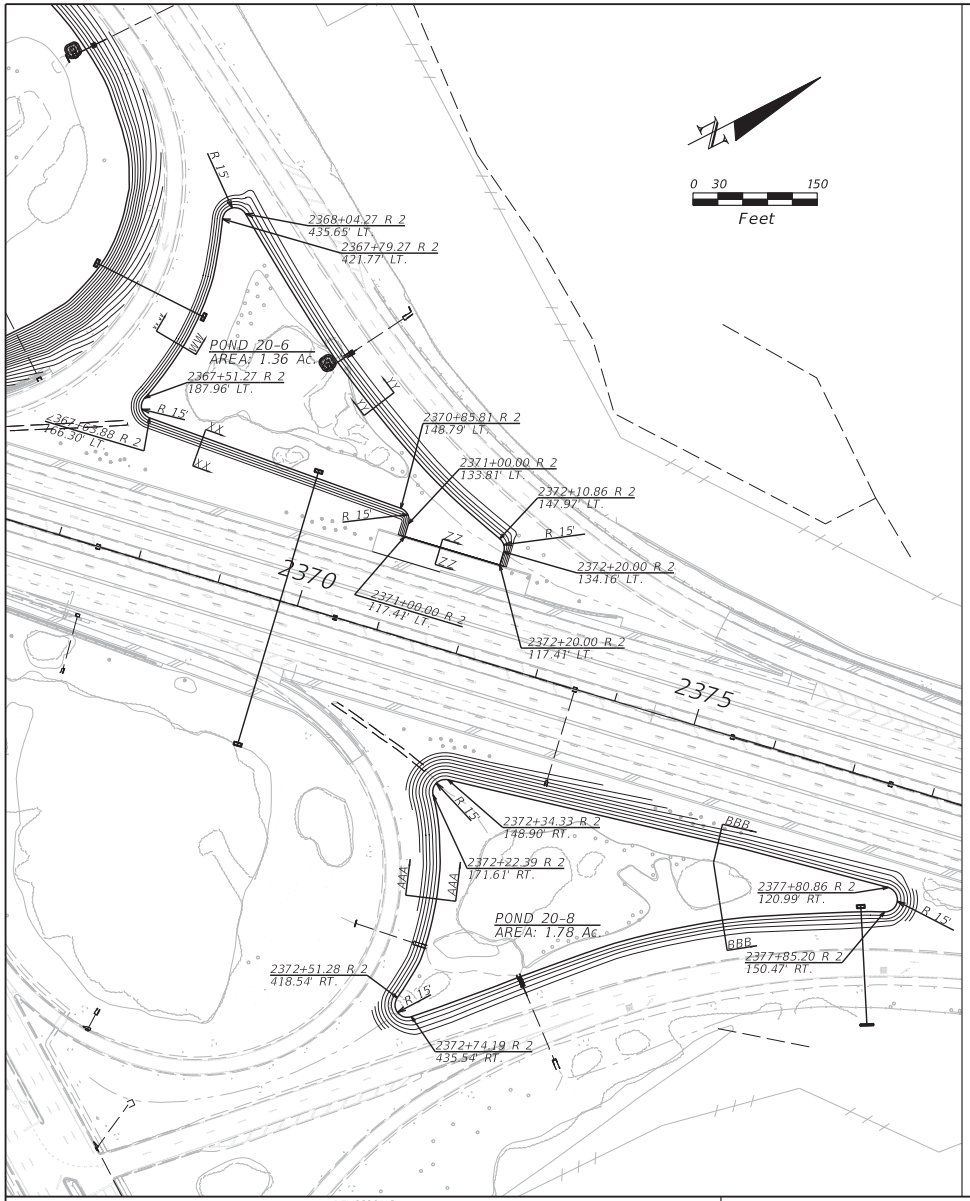

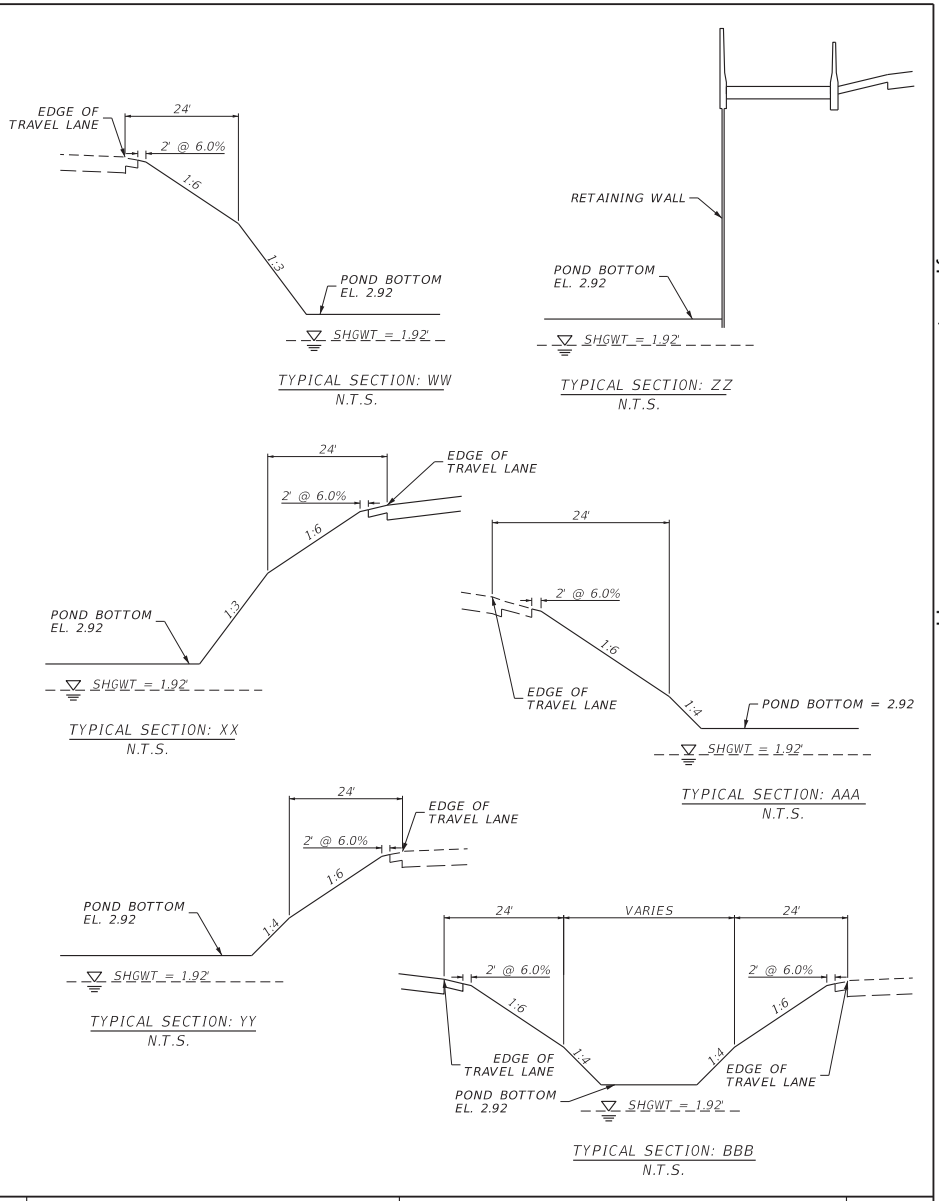

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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
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POND DETAILS

SHEET NO. PD-24

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